UNIVERSIDADE D
COIMBRA

Stephanie Raquel Gonçalves Alves

TRANSITION TO PARENTHOOD IN A PARENTHOOD IN TRANSITION:
FROM WOMEN- TO COUPLES-BASED APPROACHES

Doctoral thesis in Doctorate in Psychology, Specialty Clinical Psychology, supervised by Dr. Marco Pereira, Dr. Ana Fonseca and Professor Cristina Canavarro, and submitted to the Faculty of Psychology and Education Sciences of the University of Coimbra.

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Title

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Table of Contents

Index of Tables i

Index of Figures v

List of Abbreviations and Acronyms ix

Abstract [English] xi

Resumo [Portuguese] xv

Introductory Note xix

Contributors xxi

Chapter 1 | Theoretical Framework 1

1. Transition to parenthood: Three-perspectives approach 3

2. *Hers*: Transition to parenthood in women 5

2.1. Postpartum depression: Clinical, epidemiological and distinctive features 5

2.2. Psychosocial risk assessment: A way to identify at-risk women for PPD? 7

2.2.1. Screening tools 10

3. *Theirs*: Transition to parenthood in couples 12

3.1. Transition to parenthood as a "we affair": From an individual to a couple-based approach 12

3.2. Postpartum depression as a "we affair": From evidence to practice recommendations 15

3.3. Conceptual models applied to close relationships 17

3.3.1. The systemic-transactional model (STM) 17

3.3.1.1. Empirical evidence of the STM 22

3.3.2. Adult romantic attachment 24

3.3.2.1 Adult romantic attachment and the transition to parenthood 25

3.3.2.2. Adult romantic attachment, dyadic processes and adjustment: A call for more integrated models 26
4. Research gaps and current questions 27
4.1. *Hers* transition to parenthood 28
4.2. *Theirs* transition to parenthood 28
4.2.1. Conceptual gaps 29
4.2.2. Methodological gaps 31

Chapter II | Objectives and Method 33

1. Research objectives 35
2. Method 39
2.1. Research project design 39
2.2. Data collection procedures and participants 40
2.2.1. Procedures: Research phases I and II 40
2.2.1.1. Longitudinal study: common procedures of research phases I and II 41
2.2.1.2. Distinctive procedures of research phase I 44
2.2.2. Sample selection and attrition of the longitudinal study 46
2.2.3. Participants 48
2.2.3.1. Participants: Research phase I 49
2.2.3.2. Participants: Research phase II 51
2.3. Variables and measures 53
2.3.1. Socio-demographic, clinical and obstetric information 56
2.3.2. Screening of risk factors for PPD 57
2.3.3. Individual adjustment outcomes 59
2.3.3.1. Depressive symptoms 59
2.3.3.2. Anxiety symptoms 59
2.3.3.3. Quality of life 60

2.3.3.4. Diagnosis of PPD 60

2.3.4. Dyadic adjustment outcomes 62

2.3.4.1. Dyadic adjustment 62

2.3.5. Parental adjustment outcomes 62

2.3.5.1. Parenting stress 62

2.3.5.2. Parental confidence 63

2.3.6. Interpersonal variables 64

2.3.6.1. Dyadic coping 64

2.3.6.2. Adult attachment 65

2.3.7. Cognitive variables 66

2.3.7.1. Negative automatic postpartum thoughts 66

2.4. Data analysis 66

2.4.1. Research phase I: ROC analyses 66

2.4.2. Research phase II: Dyadic analyses 69

2.4.3. Statistical power and estimation of effect sizes 72

2.5. Ethical considerations 73

2.5.1. Conception of the research project 73

2.5.2. Implementation of the research project 74

2.5.3. Publication and dissemination of the results 76

Chapter III | Empirical Studies and Systematic Review 77

Empirical study I 79

Preliminary psychometric testing of the Postpartum Depression Predictors Inventory-Revised (PDPI-R) in Portuguese women

Empirical study II 103

Predictive validity of the Postpartum Depression Predictors Inventory-Revised (PDPI-R): A longitudinal study with Portuguese women

Empirical study III 131

Dyadic coping and dyadic adjustment in couples with women with high depressive symptoms during pregnancy

Empirical study IV 159

Does prenatal dyadic coping predict couples' postpartum psychosocial adjustment? Exploring actor and partner effects

Empirical study V 195

Romantic attachment, dyadic coping, and parental adjustment across the transition to parenthood

Empirical study VI 235

Intra-couple similarity in dyadic coping and partners' adjustment to the birth of a child

Systematic review 277

Preventing and treating women's postpartum depression: A qualitative systematic review on partner-inclusive interventions

Chapter IV | General Discussion 335

1. Summary of the main findings 337

2. General discussion of the main findings 344

2.1. Which women are at risk for PPD and how do we know? 344

2.1.1. How to identify women that are at higher risk for psychological difficulties? 345

2.2. "We-transition to parenthood": Togetherness, reciprocity and interdependence 347

2.3. Sometimes beneficial, sometimes prejudicial: The differential impact of DC across the transition to parenthood 353

2.4. Examining the efficacy of partner-inclusive interventions for PPD without partner-related information: Missing links between theory, research and clinical practice? 357

3. Strengths and limitations of the research project 360

3.1. Strengths 360

3.2. Limitations 362

4. Implications for future research 366

4.1. Embracing the strengths and overcoming the limitations of our research 366

4.2. Addressing open research questions 368

5. Implications for clinical practice 370

5.1. Clinical implications at the individual (women) level 371

5.2. Clinical implications at the dyadic level 376

5.2.1. Inclusion of couples in perinatal (mental) health care 376

5.2.1.1. Initial screening 377

5.2.1.2. Comprehensive assessment 378

5.2.1.3. Promotion of DC 379

5.2.1.4. Promotion of DC in the context of perinatal depression 383

5.2.1.5. Universal awareness about DC 385

5.3. Implications at the institutional level 387

5.3.1. Reconsidering perinatal healthcare services: What is the role of clinical psychologists? 387

References 391

Index of Tables

Chapter II | Objectives and Method

Table 1 | Specific objectives of the empirical studies and systematic review 38

Table 2 | Description of the inclusion and exclusion criteria for the longitudinal study 42

Table 3 | Participants' characteristics of the research phase I 50

Table 4 | Participants' characteristics of the research phase II 52

Table 5 | Longitudinal study: Measures and variables for each partner and assessment time 54

Table 6 | Measures used in each empirical study 56

Chapter III | Empirical Studies and Systematic Review

Empirical study I | Preliminary psychometric testing of the Postpartum Depression Predictors Inventory-Revised (PDPI-R) in Portuguese women

Table 1 | Prevalence of risk factors for total sample and by EPDS cut-off score 89

Table 2 | Descriptive statistics and correlations between PDPI-R, depressive symptoms, and cognitive risk factors 91

Table 3 | Exploratory predictive validity of the PDPI-R: ROC analyses 92

Empirical study II | Predictive validity of the Postpartum Depression Predictors Inventory-Revised (PDPI-R): A longitudinal study with Portuguese women

Table 1 | Predictive capacity of prenatal PDPI-R risk factors: univariate logistic regression analyses 113

Table 2 | Predictive capacity of postnatal PDPI-R risk factors assessed at T2: univariate logistic regression analyses 115

Table 3 | Predictive validity of the prenatal version of the PDPI-R: ROC analyses 116

Table 4 | Predictive validity of the postnatal version of the PDPI-R: ROC analyses 117

Empirical study III | Dyadic coping and dyadic adjustment in couples with women with high depressive symptoms during pregnancy

Table 1 | Sociodemographic and clinical characteristics of the sample (*N* = 289 couples) 140

Table 2 | Dimensions of dyadic coping and dyadic adjustment: Descriptive statistics, main and interaction effects of group and gender (*N* = 287 couples) 146

Table 3 | DC process within couples, by group (*N* = 289 couples) 149

Empirical study IV | Does prenatal dyadic coping predict couples' postpartum psychosocial adjustment? Exploring actor and partner effects

Table 1 | Individual adjustment and dyadic coping: descriptive statistics and univariate LCS models 174

Table 2 | Effects of dyadic coping at pregnancy (T1) on women and their partners' individual adjustment at postpartum (T2) 178

Table 3 | Associations between changes in dyadic coping and changes in individual adjustment 180

Empirical study V | Romantic attachment, dyadic coping, and parental adjustment across the transition to parenthood

Table 1 | Descriptive statistics and bivariate correlations between study variables 213

Table 2 | Indirect Effects of Common Dyadic Coping (Time 2) on the Associations Between Attachment-Related Avoidance (Time 1) and Parental Adjustment (Time 3) 216

Table 3 | Indirect Effects of Common Dyadic Coping (Time 2) on the Associations Between Attachment-Related Anxiety (Time 1) and Parental Adjustment (Time 3) 217

Empirical study VI | Intra-couple similarity in dyadic coping and partners' adjustment to the birth of a child

Table 1 | Perceived and actual similarity in dyadic coping: Descriptive statistics and comparison tests 255

Table 2 | Descriptives and intercorrelations between study main variables 257

Table 3 | Effects of Similarity in Dyadic Coping at Pregnancy (T1) and 6 weeks postpartum (T2) on Couples' Internalizing Symptoms at 6-9 Months Postpartum (T3) 259

Table 4 | Effects of Similarity in Dyadic Coping at Pregnancy (T1) and 6 weeks postpartum (T2) on Couples' Dyadic Adjustment at 6-9 Months Postpartum (T3) 261

Table 5 | Effects of Similarity in Dyadic Coping at Pregnancy (T1) and 6 weeks postpartum (T2) on Couples' Parenting Stress at 6-9 Months Postpartum (T3) 263

Systematic review | Preventing and treating women's postpartum depression: A qualitative systematic review on partner-inclusive interventions

Table 1 | Intervention characteristics of included studies assessing preventive interventions for PPD (*n* = 13) 292

Table 2 | Intervention characteristics of included studies assessing treatment interventions for PPD (*n* = 13) 296

Table 3 | Methodological quality of included studies assessing preventive and treatment interventions for PPD 300

Table 4 | Assessment characteristics of included studies assessing preventive interventions for PPD (*n* = 13) 303

Table 5 | Assessment characteristics of included studies assessing treatment interventions for PPD (*n* =13) 306

Table 6 | Intervention outcomes of preventive interventions for PPD (*n* = 13) 311

Table 7 | Intervention outcomes of treatment interventions for PPD (*n* =13) 313

Table S1 | PRISMA checklist 331

Chapter IV | General Discussion

Table 1 | Recommended cut-off scores for the PDPI-R and main risk factors, by gold standard 338

Index of Figures

Chapter I | Theoretical Framework

Figure 1 | STM: Process of stress communication of one partner and DC of the other partner 19

Figure 2 | STM: Appraisal processes and goals 20

Figure 3 | STM: Forms of DC 21

Chapter II | Objectives and Method

Figure 1 | Longitudinal study design: Assessment times for research phases I and II 39

Figure 2 | Longitudinal study: Sample selection and attrition for the research phase I 47

Figure 3 | Longitudinal study: Sample selection and attrition for the research phase II 48

Figure 4 | Graphical representation of the ROC curve 67

Figure 5 | Two-by-two contingency table of the PDPI-R's accuracy 68

Chapter III | Empirical Studies and Systematic Review

Empirical study I | Preliminary psychometric testing of the Postpartum Depression Predictors Inventory-Revised (PDPI-R) in Portuguese women

Figure 1 | ROC curve of the postnatal version of the PDPI-R for the detection of probable clinical depression (EPDS > 9) 93

Empirical study II | Predictive validity of the Postpartum Depression Predictors Inventory-Revised (PDPI-R): A longitudinal study with Portuguese women

Figure 1 | ROC curve of the prenatal and postnatal versions of the PDPI-R for the detection of postpartum depression (SCID) 116

Empirical study III | Dyadic coping and dyadic adjustment in couples with women with high depressive symptoms during pregnancy

Figure 1 | Mean scores of emotion-oriented supportive dyadic coping (DC) by oneself, emotion-oriented supportive 148

DC by partner, problem-oriented supportive DC by partner, delegated DC by partner, emotion-oriented common DC and problem-oriented common DC, by group

Empirical study IV | Does prenatal dyadic coping predict couples' postpartum psychosocial adjustment? Exploring actor and partner effects

Figure 1 | Conceptual diagram showing the long-term actor and partner effects of dyadic coping (DC) dimensions on women and their partners' postpartum individual adjustment 167

Figure 2 | Mean scores of internalizing symptoms, quality of life and negative dyadic coping (DC) by parity (primiparous vs. multiparous couples) and time (Time 1 = second trimester of pregnancy; Time 2 = 6-weeks postpartum), adjusted for timing of pregnancy assessment and timing of postpartum assessment 175

Empirical study V | Romantic attachment, dyadic coping, and parental adjustment across the transition to parenthood

Figure 1 | Conceptual diagram of the proposed actor partner interdependence mediation model 206

Figure 2 | Statistical diagram of the proposed actor partner interdependence mediation model considering parenting stress as the outcome 215

Figure 3 | Statistical diagram of the proposed actor partner interdependence mediation model considering parental confidence as the outcome 219

Empirical study VI | Intra-couple similarity in dyadic coping and partners' adjustment to the birth of a child

Figure 1 | Conceptual diagram of the long-term effects of similarity in dyadic coping (DC) on women and their partners' postpartum adjustment 246

Systematic review | Preventing and treating women's postpartum depression: A qualitative systematic review on partner-inclusive interventions

Figure 1 | Flow chart illustrating identification of included studies 290

Chapter IV | General Discussion

Figure 1 | Graphical representation of the longitudinal associations between DC and adjustment outcomes 342

Figure 2 | Comprehensive integration of findings in research phase II 357

Figure 3 | Comprehensive integration of the clinical implications on the individual and dyadic levels (second trimester of pregnancy) 373

Figure 4 | Comprehensive integration of the clinical implications on the individual and dyadic levels (six weeks postpartum) 375

List of Abbreviations and Acronyms

ACOG	American College of Obstetricians and Gynecologists
APA	American Psychological Association
APIM	Actor-Partner Interdependence Model
AUC	Area Under the Curve
CCET	Couples Coping Enhancement Training
CCC-P	Couples Care and Coping Program
CCP	Couple CARE for Parents
COCT	Coping-Oriented Couple Therapy
CHUC	Centro Hospitalar e Universitário de Coimbra
DC	Dyadic Coping
DCI	Dyadic Coping Inventory
DSM	Diagnostic and Statistical Manual of Mental Disorders
ECR-RS	Experience in Close Relationships - Relationship Structures
EPDS	Edinburgh Postnatal Depression Scale
FIML	Full Information Maximum Likelihood
GAD	Generalized Anxiety Disorder scale
HADS-A	Hospital Anxiety and Depression Scale – Anxiety subscale
LCS	Latent Change Score
MDM	Maternity Daniel de Matos
mMD	Minor or major depressive episode
MR	Misclassification Rate
NICE	National Institute for Health and Clinical Excellence
NPV	Negative predictive value
PCQ	Parental Confidence Questionnaire
PDPI-R	Postpartum Depression Predictors Inventory – Revised

PNTQ	Postnatal Negative Thoughts Questionnaire
PPD	Postpartum depression
PPV	Positive predictive value
PSI-SF	Parenting Stress Index-Short Form
QoL	Quality of life
RDAS	Revised Dyadic Adjustment Scale
ROC	Receiver Operating Characteristic
SCID-I	Structured Clinical Interview for DSM-IV Axis I Disorders
SEM	Structural equation modeling
SIGN	Scottish Intercollegiate Guidelines Network
STM	Systemic-Transactional Model
T1	Second trimester of pregnancy
T2	Six weeks postpartum
T3	Six-nine months postpartum
UnIP	Psychological Intervention Unit
WHOQOL	World Health Organization Quality of Life working group

Abstract

Background

The transition to parenthood encompasses multiple changes and reorganizations in a couple's life that both women and their partners need to manage as individuals and as a couple. Postpartum depression (PPD) symptoms are often undetected in perinatal care services, thereby the early identification of women at risk for PPD is deemed necessary. The Postpartum Depression Predictors Inventory – Revised (PDPI-R) was developed to predict women's risk for developing this clinical condition that impair the adjustment to parenthood. The psychometric properties of the PDPI-R have not yet been examined in Portugal. Couple-related dynamics are consistently identified as risk/protective factors for an adaptive adjustment during the transition to parenthood. However, few studies have adopted a dyadic approach and an interpersonal framework to understand how the couple's dynamics influence both partners' individual, marital and parental outcomes. Moreover, a large body of literature has shown that interpersonal processes are central in the development and maintenance of PPD, which has motivated several researchers to include both members of the couple (the woman and her partner) in preventive and treatment interventions for PPD. There is now a need to translate this research into clear guidelines regarding the inclusion of male partners in such interventions. The general objectives of this PhD project were to: (a) adapt the PDPI-R for the Portuguese population (Phase I); (b) obtain a comprehensive understanding of the role of dyadic coping (DC) on both partners' adjustment during the transition to parenthood, considering the mutual influences within the couple (Phase II); and (c) synthetize the current knowledge about the participation of the male partners in psychosocial and psychological interventions delivered to women and targeting PPD (Phase III).

Methods

This research project comprised three phases. Phase I focused on the adaptation of the PDPI-R to the European Portuguese language. The reliability and construct and convergent validity of the PDPI-R were assessed in a cross-sectional study (pilot study; *N* = 204 women). The predictive validity of the PDPI-R was subsequently assessed in a prospective longitudinal study (field study), in which women (*N* = 325) completed four assessment

time points: T1 (second trimester of pregnancy), T2 (six weeks postpartum), SCID (four months postpartum), and T3 (six-nine months postpartum). Phase II comprised the same longitudinal study (with the exception of the SCID assessment), including women and their partners (*N* = 303 couples). Both members of the couple completed self-report questionnaires, assessing individual (i.e., depressive and anxiety symptoms, quality of life [QoL]), dyadic (dyadic adjustment) and parental (i.e., parenting stress and parental confidence) adjustment outcomes as well as interpersonal variables (i.e., DC and romantic attachment). In Phase III, a systematic review of studies that have tested the efficacy of interventions either to prevent or treat PPD in women and have included the woman's partner was conducted.

Results

Findings in Phase I showed that the Portuguese version of the PDPI-R is a reliable and valid tool to identify women at greater risk for developing PPD. The main results in Phase II were that: (a) couples in which the woman was experiencing high levels of depressive symptoms at T1 engaged less in positive forms and more in negative forms of DC compared to couples in which the woman presented minimal/no depressive symptoms; (b) common DC at T1 contributed to better QoL of both women and their partners at T2; (c) decreases in common DC were related to increases in internalizing symptoms and decreases in QoL from T1 to T2; (d) women and men with more avoidant romantic attachment representations engaged less in common DC from T1 to T2 which, consequently, increased their partner's parenting stress (only in women) and decreased their partner's parental confidence (in both members) from T2 to T3; and (e) perceiving high similarity in DC at T2 contributed to lower internalizing symptoms and parenting stress in the other partner at T3, while perceiving more complementarity (as opposed to similarity) at T1 leads to lower internalizing symptoms in oneself at T3. Finally, the studies included in the systematic review reported limited information related to the male partner's participation, thereby restricting the comprehension of its role in the prevention and treatment of women's PPD.

Conclusions

The findings of this PhD project highlight the need of a paradigm shift in current perinatal clinical and research contexts, from a women-centered perspective to a holistic approach that considers the mental health of both women and their partners. They also encourage the routine use of the PDPI-R in Portuguese maternity and primary care settings to increase the primary prevention of PPD. Moreover, they painted a picture of the transition to parenthood as a shared and interdependent experience between partners. The identification of modifiable processes associated with partners' wellbeing (i.e., DC) highlight innovative avenues for perinatal preventive interventions aimed at facilitating both partners' adjustment as individuals and parents as well as for future perinatal research with couples in Portugal and other cultural backgrounds.

Keywords

Transition to parenthood • Postpartum depression • Postpartum Depression Predictors Inventory – Revised • Dyadic interdependence • Dyadic coping • Partner-inclusive interventions

Resumo

Introdução

A transição para a parentalidade engloba várias mudanças e reorganizações na vida do casal que tanto as mulheres como os seus parceiros precisam de gerir como indivíduos e como casal. Geralmente, os sintomas de depressão pós-parto (DPP) não são detetados nos serviços de saúde perinatal, pelo que a identificação precoce de mulheres em risco de DPP é considerada necessária. O Inventário de Fatores de Risco para a Depressão Pós-Parto – Revisto (PDPI-R) foi desenvolvido para prever o risco de as mulheres virem a desenvolver essa condição clínica, a qual prejudica o ajustamento à parentalidade. As propriedades psicométricas do PDPI-R ainda não foram examinadas em Portugal. As dinâmicas de casal são consistentemente identificadas como fatores de risco/proteção para um ajustamento positivo durante a transição para a parentalidade. No entanto, poucos estudos adotaram uma abordagem diádica e um modelo interpessoal para compreender como as dinâmicas de casal influenciam os resultados individuais, conjugais e parentais de ambos os parceiros. Para além disso, uma vasta literatura mostrou que os processos interpessoais são centrais no desenvolvimento e manutenção da DPP, o que motivou vários investigadores a incluir os dois membros do casal (mulher e parceiro) nas intervenções de prevenção e tratamento para a DPP. Existe agora a necessidade de traduzir esta investigação em diretrizes claras sobre a inclusão dos parceiros em tais intervenções. Os objetivos gerais deste projeto de doutoramento foram: (a) adaptar o PDPI-R para a população Portuguesa (Fase I); (b) obter uma compreensão abrangente do papel do *coping* diádico (CD) no ajustamento de ambos os parceiros durante a transição para a parentalidade, considerando as influências mútuas dentro do casal (Fase II); e (c) sintetizar o conhecimento atual sobre a participação dos parceiros em intervenções psicossociais e psicológicas dirigidas a mulheres e que visam a DPP (Fase III).

Metodologia

Este projeto de investigação envolveu três fases. A fase I focou-se na adaptação do PDPI-R à língua Portuguesa Europeia. A fiabilidade e a validade de construto e convergente do PDPI-R foram avaliadas num estudo transversal (estudo piloto; N = 204 mulheres). A validade preditiva do PDPI-R foi posteriormente avaliada num estudo prospetivo

longitudinal (estudo de campo), no qual as mulheres (*N* = 325) completaram quatro momentos de avaliação: T1 (segundo trimestre de gravidez), T2 (seis semanas pós-parto), SCID (quatro meses pós-parto) e T3 (seis-nove meses pós-parto). A fase II incluiu o mesmo estudo longitudinal (com exceção da SCID), incluindo as mulheres e os seus parceiros (*N* = 303 casais). Ambos os membros do casal completaram questionários de autorresposta, avaliando indicadores de ajustamento individual (isto é, sintomas depressivos e ansiosos, qualidade de vida [QdV]), diádico (ajustamento diádico) e parental (isto é, stresse parental e confiança parental), bem como variáveis interpessoais (isto é, CD e vinculação romântica). Na Fase III, foi realizada uma revisão sistemática dos estudos que testaram a eficácia de intervenções para prevenir ou tratar a DPP em mulheres e incluíram o parceiro da mulher.

Resultados

Os resultados da Fase I mostraram que a versão portuguesa do PDPI-R é uma medida fiável e válida para identificar as mulheres com maior risco de vir a desenvolver DPP. Os principais resultados na Fase II foram: (a) os casais em que a mulher apresentava elevados níveis de sintomas depressivos no T1 envolviam-se menos em formas positivas e mais em formas negativas de CD em comparação com casais em que a mulher apresentava nenhum sintoma ou sintomas depressivos mínimos; (b) o CD comum no T1 contribuiu para uma melhor QdV tanto das mulheres como dos seus parceiros no T2; (c) a diminuição do CD comum associou-se a um aumento dos sintomas internalizantes e diminuição da QdV de T1 para T2; (d) as mulheres e homens com representações de vinculação romântica mais evitantes envolveram-se menos em CD comum de T1 para T2 o que, consequentemente, aumentou o stresse parental do parceiro (apenas em mulheres) e diminuiu a confiança parental do parceiro (em ambos os membros) de T2 para T3; e (e) perceber elevada similaridade no CD no T2 contribuiu para diminuir os sintomas internalizantes e o stresse parental no outro parceiro no T3, enquanto perceber mais complementaridade (em oposição à similaridade) no T1 levou a menores sintomas internalizantes no próprio no T3. Por fim, os estudos incluídos na revisão sistemática reportaram informações limitadas relacionadas à participação do parceiro, restringindo assim a compreensão do seu papel na prevenção e no tratamento da DPP nas mulheres.

Conclusões

Os resultados deste projeto de doutoramento destacam a necessidade de uma mudança de paradigma nos atuais contextos clínicos e de investigação perinatal, de uma perspetiva centrada nas mulheres para uma abordagem holística que considere a saúde mental das mulheres e dos seus parceiros. Eles encorajam o uso do PDPI-R como instrumento de rastreio universal nas maternidades e centros de cuidados primários portugueses de forma a aumentar a prevenção primária da DPP. Além disso, eles retratam a transição para a parentalidade como uma experiência partilhada e interdependente entre os parceiros. A identificação de processos modificáveis associados ao bem-estar dos parceiros (isto é, o CD) destacam caminhos inovadores para intervenções perinatais preventivas destinadas a facilitar o ajustamento de ambos os parceiros como indivíduos e pais, bem como para a investigação perinatal futura com casais em Portugal e em outros contextos culturais.

Palavras-chave

Transição para a parentalidade • Depressão pós-parto • Inventário de Fatores de Risco para a Depressão Pós-Parto – Revisto • Interdependência diádica • *Coping* diádico • Intervenções inclusivas do parceiro

Introductory Note

The primary prevention of PPD (including its prediction), the role of couple-related characteristics (e.g., relationship satisfaction, partner support) for partners' adjustment during the transition to parenthood and the inclusion of the male partner in interventions addressing women's PPD have received considerable attention in the field of perinatal mental health research. However, to move this field forward, researchers should, on one hand, more closely incorporate the contributions of the broad dyadic research, at both conceptual and methodological levels and, on the other hand, translate research into evidence-based guidelines for clinical practice. The present PhD project aims to be a fruitful contribution in this sense.

Our research work was developed within the research group *Relationships, Development & Health* of the R&D Unit Center for Research in Neuropsychology and Cognitive-Behavioral Intervention (CINEICC) of the Faculty of Psychology and Education Sciences, University of Coimbra. This research project is interrelated to an ongoing postdoctoral project focused on the prevention of PPD in women carried out at the same Research Unit. The implementation of the present research project also comprised a research internship, which occurred between September 18 and December 18, 2017, at the University of Zurich (Switzerland), Department of Psychology, at the Chair of Clinical Psychology (Children/Youth and Couples/Families), under the scientific supervision of Professor Dr. Guy Bodenmann.

This dissertation comprises four chapters, herein briefly described. **Chapter I | Theoretical Framework** includes a brief review of the current literature on the topic of PPD and its prediction and interpersonal aspects of the transition to parenthood and PPD, moving on to a succinct overview of conceptual models of close relationships (STM and attachment theory), and ends with a summary of the main conceptual and methodological gaps identified in the literature reviewed.

Chapter II | Objectives and Method encompasses the general and specific aims of this PhD project, the study design, procedures, participants and methodological options, including the assessment instruments and statistical methods, as well as the ethical principles that guided the distinct stages of our research work (since its conception to its implementation and dissemination). The present PhD project involved three phases: (I)

the Portuguese validation studies of the PDPI-R; (II) the study of interpersonal variables (e.g., dyadic processes) in relation to both women and their partners' adjustment to the perinatal period, considering prospective quantitative longitudinal dyadic data; and, (III) a systematic review addressing the inclusion of partners in interventions targeting women's PPD.

Chapter III | Empirical Studies and Systematic Review comprises seven original studies (six empirical studies and a systematic literature review) presented in the format of scientific papers. Four of these studies are already published or accepted for publication in international peer-reviewed journals, and the remaining studies are currently under review. The first two studies of this project pertain to phase I (empirical study I and II), four studies pertain to phase II (empirical study III to VI), and the systematic review pertains to phase III.

Finally, **Chapter IV | General Discussion** provides an overview and critical discussion of the main results of this PhD project, outlining its conceptual and methodological strengths as well as limitations. In this chapter, we also discuss relevant implications for future research in the field of PPD prediction and dyadic perinatal research and we present several evidence-based guidelines for clinical practice with couples expecting a child. We conclude with the outlining of brief recommendations that aim to guide the role of clinical psychologists working in maternity and primary care settings to easy the implementation of the recommendations driven from our PhD project.

Contributors

Stephanie Raquel Gonçalves Alves | University of Coimbra

Stephanie Alves (PhD candidate) took the lead in conceiving the original idea of this research project, by collecting all the data, reviewing the literature, developing the specific objectives and hypothesizes, performing the data analyses and writing the first versions of all the manuscripts.

Marco Daniel de Almeida Pereira | University of Coimbra

Dr. Marco Pereira was the main supervisor of this PhD project. He was in charge of overall designing and planning of this research work, encouraged Stephanie Alves to investigate innovative ideas and supervised the findings of her research work. He also contributed to the writing of the final version of all the manuscripts as well as of the complete PhD thesis.

Ana Dias da Fonseca | University of Coimbra

Dr. Ana Fonseca supervised this PhD project, by participating in the study design and implementation of the project, also assisting with the interpretation of some of the results and contributing (revision, edition) to the final version of all manuscripts and of the complete PhD thesis.

Maria Cristina Cruz Sousa Portocarrero Canavarro | University of Coimbra

Professor Cristina Canavarro supervised this PhD project, by participating in the conception of the original idea of this research project, as well as its design and implementation. She also participated in the revision and editing of the manuscripts and of the final version of the PhD thesis.

Alexandra Martins | University of Coimbra

Alexandra Martins contributed to the preparation of the systematic review (Phase III), by helping to review the studies included and providing critical feedback to, and reviewing the final version, of the manuscript.

Anne Milek | University of Zurich

Dr. Anne Milek contributed to the preparation of the empirical study V, which was prepared during the research internship at the University of Zurich, Switzerland. She assisted with the data analyses and provided critical feedback at each stage of the writing of the manuscript.

Guy Bodenmann | University of Zurich

Professor Guy Bodenmann is the author of the main theoretical framework adopted in this PhD project (the STM). He contributed to the preparation of the empirical study V, by assisting with the conceptual design of the study and collaborated with the writing and editing of the manuscript.

Chapter I

Theoretical Framework

1. Transition to parenthood: Three-perspectives approach

The transition to parenthood is a normative and usually positive life event for couples, yet it implies several challenges for women, men, and the couple as a whole. During the course of pregnancy, couples must cope with emotional diversity, their expectations about life changes associated with the baby's arrival and the need to balance both partners' individuality and increased interdependence in their lives as a couple. At the same time, shared concerns regarding the health of the fetus/baby, future parenting skills, and their developing relationships with the baby emerge (Cowan & Cowan, 2000). Considerable interpersonal changes also occur within the couple's relationship and in the relationships with their own parents, friends and co-workers, and (when applicable) previous children (Canavarro, 2001; Cowan & Cowan, 2000). After childbirth, couples must continue to manage these reorganizations while they strive to restructure and negotiate family roles and adapt to their new responsibilities (Cowan & Cowan, 2000; St John, Cameron, & McVeigh, 2005). Couples expecting a second or third child also experience a transition to parenthood (Cowan & Cowan, 2012), characterized by similar but also different changes and reorganizations in the current familial system (e.g., caring for more than one child), which are likely to be perceived as stressful (Philpott, Leahy-Warren, FitzGerald, & Savage, 2017). Indeed, the transition to a second parenthood, if less *dramatic*, can be more *complex* than the transition to first-time parenthood (Goldberg & Michaels, 1988), with evidence supporting that the second-time around is not necessarily easier (Ketner, Gravesteijn, & Verschuur, 2018)[1].

Dealing with this set of stress-inducing events requires a number of responses (at the emotional, cognitive, and behavioral levels) that are usually not part of the parents' coping repertoire (Canavarro & Araújo Pedrosa, 2005). Consequently, first and non-first-time parents may present some adjustment difficulties during the perinatal period (conventionally viewed as the period from pregnancy to one year after childbirth), especially when the coping resources are inexistent or inadequate. In such cases, women and their partners are at increased risk from developing depressive (Cameron, Sedov, & Tomfohr-Madsen, 2016; Norhayati, Nik Hazlina, Asrenee, & Wan Emilin, 2015) and anxiety (Dennis, Falah-Hassani, & Shiri, 2017; Leach, Poyser, Cooklin, & Giallo, 2016) symptoms, experiencing declines in their quality of life (QoL) (Condon, Boyce, &

[1] In the present research, the term "transition to parenthood" was broadly defined, including both first and subsequent (e.g., second, third) transitions to parenthood.

Corkindale, 2004; Ngai & Ngu, 2013) and relationship satisfaction (Delicate, Ayers, & McMullen, 2018; Doss & Rhoades, 2017), as well as perceiving high stress in their parental role (Epifanio, Genna, De Luca, Roccella, & La Grutta, 2015) and low confidence in their parental skills (Entsieh & Hallström, 2016). A substantial amount of research has focused on the adjustment to the transition to parenthood, which can be summarized within three perspectives (Mickelson & Biehle, 2017): *hers*, *his*, and *theirs*.

Hers. Traditionally, the transition to parenthood has been studied from a mother-centered perspective, with thousands of studies being published in the topic of transition to motherhood. Particularly, extensive research has focused on postpartum depression (PPD) and has been synthesized in numerous available reviews, most of them addressing the prevalence and course of PPD, risk factors, consequences and intervention approaches (O'Hara & McCabe, 2013).

His. Over the past years, the many changes in the conception of fatherhood (Cabrera, Volling, & Barr, 2018; Eggebeen, Knoester, & McDaniel, 2013) have stimulated increased research aimed to address men's specific concerns and challenges during the transition to parenthood (Kowlessar, Fox, & Wittkowski, 2015a, 2015b), their adjustment to this period (especially in terms of depressive/anxiety symptoms; Cameron et al., 2016; Leach et al., 2016), as well as their needs of professional support (Cameron, Hunter, Sedov, & Tomfohr-Madsen, 2017; Rominov, Giallo, Pilkington, & Whelan, 2018). Although initial research focused primarily on the impact of women's PPD on the wellbeing of their male partners (e.g., Davey, Dziurawiec, & O'Brien-Malone, 2006; Roberts, Bushnell, Collings, & Purdie, 2006), a *genuine* interest on the experience of men transitioning to fatherhood – regardless of their partner's mental health status – is substantially growing.

Theirs. Finally, past quantitative and qualitative research has largely documented the connections between women's postpartum depressive symptoms and the couple's relationship either in community and clinical samples and has been translated into partner-inclusive interventions for addressing PPD in women. However, the antecedents and consequences of the *interplay* between partners during the transition to parenthood (in its broadest sense, outside the specific context of PPD) constitute an area of perinatal research that remains under-addressed (Mickelson & Biehle, 2017). Indeed, only quite recently studies have begun to move from an individual-centered perspective to consider the couple as the unit of analysis, which means that the interdependence and mutual

influences within a couple have started to be taken into account (e.g., Figueiredo et al., 2018; Ryon & Gleason, 2018). The main topics addressed in the present research cover these three perspectives. In the following sections we will briefly review some of the existing literature within them[2].

2. *Hers*: Transition to parenthood in women

2.1. Postpartum depression: Clinical, epidemiological and distinctive features

Postpartum depression is the most common mental health complication of childbirth, entailing major public health challenges worldwide (Hahn-Holbrook, Cornwell-Hinrichs, & Anaya, 2018; O'Hara & McCabe, 2013). The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5; American Psychiatric Association, 2013) classifies depression with "peripartum onset" if the symptoms started during pregnancy or within the first four weeks postpartum. Accordingly, PPD presents the same symptomatology that an episode of major depressive disorder (i.e., depressed mood and/or loss of interest or pleasures in activities that persist for more than two weeks), which onset occurs within the first month after childbirth. Despite this temporal specifier, clinical practice and research consistently showed that PPD might develop at any point along the first year after the birth of a child, being the first three months postpartum a particularly vulnerable timeframe (Gavin et al., 2005). Moreover, in some circumstances, PPD can manifest a chronic course, extending throughout the first year postpartum and beyond (Goodman, 2004b; Vliegen, Casalin, & Luyten, 2014). Comorbidity with anxiety disorders (or symptoms thereof) is also common (Falah-Hassani, Shiri, & Dennis, 2017).

Despite the variety of instruments used, diagnosis criteria, postpartum period under consideration, and the socioeconomic and health disparities across the studies that turn difficult to accurately define PPD prevalence (Hahn-Holbrook et al., 2018; Norhayati et al., 2015), it is estimated that about 13-20% of women experience PPD (Gavin et al., 2005; Hahn-Holbrook et al., 2018; O'Hara & Swain, 1996). In Portugal, the prevalence estimates of clinically relevant depressive symptoms in women reach 18-20% at six-seven

[2] Although the adjustment of men (*his* perspective) was also addressed in the present project, the specific literature on this topic was integrated into *theirs* perspective, as our predominant focus was on women's PPD (*hers* perspective) and both members of the couple adjustment (*theirs* perspective) rather than exclusively on men.

weeks postpartum (Pereira et al., 2017; Pereira et al., 2016) and vary between 11% and 27% at three months postpartum (Figueiredo & Conde, 2011; Figueiredo & Costa, 2009; Pereira et al., 2017) as measured by self-report instruments; also, between 2.7% and 11.7% of Portuguese women present a clinical diagnosis of PPD in the first three months after childbirth (Bos et al., 2013; Maia et al., 2011; Pereira et al., 2017).

Postpartum depression should be distinguished from postpartum/baby blues and postpartum psychosis: the former commonly occurs within the first few days after delivery, susceptible to be experienced by approximately 40% to 80% of women and is marked by mild and transient mood changes, crying, anxiety, irritability, trouble sleeping, and loss of appetite; postpartum psychosis in the other side is a rare condition that affects 0.1% to 0.5% of women, generally during the first two weeks postpartum, and is characterized by confusion, cognitive impairments indicative of delirium, bizarre behavior, unusual hallucinations and altruistic homicide delusion (O'Hara & McCabe, 2013; O'Hara & Wisner, 2014). On the other hand, along with typical cognitive and somatic depressive symptoms, which are persistent and cause significant suffering and functional impairments (American Psychiatric Association, 2013), women with PPD commonly describe feelings of loneliness, worthlessness and helplessness, loss of sense of self, guilt, failure and insecurity regarding their role as a mother; likewise, they might feel angry because of the discrepancy between motherhood expectations and reality, and tend to withdraw from other people, particularly other mothers, as they do not feel understood (Mollard, 2014; Tammentie, Paavilainen, Åstedt-Kurki, & Tarkka, 2004).

The recognition of PPD symptoms in primary care is not always done timely, persistent symptoms of PPD are often missed, and women rarely receive treatment or are referred to mental health services (Goodman & Tyer-Viola, 2010; Henshaw, Sabourin, & Warning, 2013). Moreover, although a variety of interventions have been validated for the prevention and treatment of PPD (e.g., Clatworthy, 2012; Dennis & Hodnett, 2007), and women value and recognize the benefits of mental health care support (Hadfield & Wittkowski, 2017), they rarely seek and accept professional help to cope with their symptoms. Common barriers that prevent women from seeking mental health support include personal (e.g., poor knowledge about PPD, stigma) and system-related (e.g., negative expectations of health care) factors (Dennis & Chung-Lee, 2006; Fonseca, Gorayeb, & Canavarro, 2015; Hadfield & Wittkowski, 2017). This is a pressing concern attending to the negative consequences of PPD for mothers, infants, and the whole family.

Women experiencing PPD tend to report poor maternal health (Muzik & Borovska, 2010), more disturbances in the interactions with their children (Field, 2010; Tronick & Reck, 2009), including less breastfeeding (Pope & Mazmanian, 2016), and their children are at increased risk of developmental impairments (e.g., cognitive, behavioral, and social-emotional; Grace, Evindar, & Stewart, 2003; Kingston, Tough, & Whitfield, 2012). Moreover, existing literature has yielded evidence for the links between maternal depression and paternal depression during the perinatal period (Cameron et al., 2016; Paulson & Bazemore, 2010), with women's PPD being the strongest risk factor for depression in their partners (Goodman, 2004a; Wee, Skouteris, Pier, Richardson, & Milgrom, 2011). Taken all these aspects together, the pervasive impact of PPD makes efforts at prevention, early identification and treatment worthwhile.

While psychosocial and biological vulnerabilities to PPD have been suggested (Brummelte & Galea, 2016; Yim, Stapleton, Guardino, Hahn-Holbrook, & Schetter, 2015) and integrated in etiological models (O'Hara & McCabe, 2013), the specific etiology of PPD still remains imprecise. Numerous studies – most cross-sectional and/or relying on self-report questionnaires to assess PPD – have explored psychosocial risk factors, and reported history of psychiatric illnesses (namely depression), depression and anxiety during pregnancy, poor marital relationships and social support, lack of self-esteem, postpartum/baby blues, stressful life events and stress associated with childcare as main predictors of PPD (for reviews see Beck, 2001; Norhayati et al., 2015; Robertson, Grace, Wallington, & Stewart, 2004; Yim et al., 2015). Based on this evidence, several efforts have been made to identify women at higher risk for PPD and to minimize its development.

2.2. Psychosocial risk assessment: A way to identify at-risk women for PPD?

The perinatal period offers a unique window for the early recognition and prevention of mental health problems, as it is timely defined by two specific events (i.e., pregnancy and childbirth) and women are regularly followed during this time (O'Hara & McCabe, 2013). An intense debate around screening for PPD (i.e., brief assessment of postpartum depressive symptoms to detect women with a possible current PPD) has marked the past few years, resulting in inconclusive evidence regarding the balance of benefits and harms of this practice (Myers et al., 2013; Thombs et al., 2014). Likewise, a

recurring theme in perinatal mental health screening is the relevance of conducting a *psychosocial assessment* (Austin & The Marcé Society Position Statement Advisory Committee, 2014).

All women who gave birth can develop mental health problems, but some women may present particular vulnerability factors putting them at high-risk for developing such difficulties. Psychosocial assessment is the term commonly used to design the assessment of women past and current psychosocial risk factors that are known to be associated with poor maternal health outcomes (e.g., mental illness history), while including depression screening (Austin, 2004). This holistic assessment has value in its own right, as it allows to open the discussion of any difficulties women may be experiencing (and that may otherwise be ignored), as well as increase women's and health professional's awareness/education of perinatal depression screening, psychosocial issues, and the services available to women who need help (Austin & The Marcé Society Position Statement Advisory Committee, 2014). The psychosocial assessment has been generally viewed as a positive practice by primary health care professionals and women (e.g., Kalra, Reilly, & Austin, 2018; Matthey et al., 2005), with the important benefit of facilitating health professional's decision-making about best care options (Johnson et al., 2012; Milgrom & Gemmill, 2014). Because a common approach in conducting a psychosocial assessment has been the identification of risk factors associated with perinatal depression (Milgrom & Gemmill, 2014), it matters particularly for the primary prevention of PPD. That is, even when women are not depressed at the time of screening, they may develop this condition later in the postpartum period; therefore, they may benefit from a complementary assessment about potential psychosocial vulnerabilities, which, in case of need, may be targeted in preventive interventions and women's risk for PPD further minimized (Beck, 2002; Beck, Records, & Rice, 2006).

The current guidelines for the detection and management of perinatal mental disorders are mixed. The routine screening of perinatal mental health is currently recommended in many countries, including the United Kingdom (National Institute for Health and Clinical Excellence [NICE], 2014 updated 2018), Australia (Austin, Highet, & The Expert Working Group, 2017), Scotland (Scottish Intercollegiate Guidelines Network [SIGN], 2012), and the United States (American College of Obstetricians and Gynecologists [ACOG], 2015), while a comprehensive psychosocial assessment – which includes, but is not limited to, depression/anxiety screening – has been less consistently

endorsed. For instance, in the United Kingdom, the NICE guidelines (2014 updated 2018) recommend universal perinatal depression and anxiety screening, by using the Whooley questions ("During the past month, have you often been bothered by feeling down, depressed or hopeless?" and "During the past month, have you often been bothered by having little interest or pleasure in doing things?") and two items of the Generalized Anxiety Disorder scale (GAD-2; "Over the last 2 weeks, how often have you been bothered by feeling nervous, anxious or on edge?" and "Over the last 2 weeks, how often have you been bothered by not being able to stop or control worrying?"); in case of positive screens, longer screening tools are administrated (e.g., the Edinburgh Postnatal Depression Scale [EPDS] and GAD-7). This assessment was expanded to include the assessment of key psychosocial risk factors, but only in women who screened positive for depression or other mental health problems.

On the other hand, the Australian Clinical Practice Guidelines (Austin et al., 2017) and the Marcé Position Statement (Austin & The Marcé Society Position Statement Advisory Committee, 2014) point toward the universal and simultaneous assessment of psychosocial risk and current depressive and anxiety symptoms, in order to identify women either at risk, or currently experiencing, perinatal mental health problems. Taken both guidelines together, it is recommended that this assessment should: (a) occur as early as practical in pregnancy (ideally at women's first appointment) and between 6 and 12 weeks after childbirth, with repeated assessments as clinically indicated/needed; the assessment of depressive/anxiety symptoms should be repeated at least once later in pregnancy and during the first year postpartum; (b) be undertaken by trained health professionals, namely primary health care professionals with support from mental health services; and (c) be integrated into existing maternity care and, importantly, entirely incorporated with further care pathways (i.e., follow-up and appropriate referrals).

For example, in Australia, this combined assessment has already been implemented in maternity hospitals and primary care settings (Austin, Middleton, Reilly, & Highet, 2013), mostly in the public sector (Reilly et al., 2013a). While initial benefits have been documented (e.g., increased of women's help-seeking behaviors in case of need and appropriate referrals for further support; Matthey et al., 2005; Reilly et al., 2014; Reilly et al., 2013b), the current evidence about the clinical and cost-effectiveness of this approach is scarce and mixed (Felice, Agius, Sultana, Felice, & Calleja-Agius, 2018); well-designed trials to further elucidate on this topic are underway (e.g., Reilly et al., 2017). In contrast,

in Portugal, although women are routinely followed during pregnancy and approximately at 6 weeks postpartum in obstetric and/or family doctors' appointments, and effective resources for further assessment and support to at-risk women are available on-site (e.g., psychosocial services are freely available in major Public Maternity Hospitals and General Hospitals), perinatal depression screening or psychosocial risk assessment are not routinely executed in maternity or primary healthcare centers (Fonseca & Canavarro, 2017; Fonseca et al., 2015). Despite this current reality, there is an increasing interest for the early identification of women with, or at risk for, perinatal depression in Portugal, with initial evidence supporting the acceptability of such screening procedures by women and primary health care professionals (Pereira et al., 2016). Moreover, a Portuguese Speaking Group (which consisted in a collaboration between Portugal and Brazil) has recently emerged within the Marcé International Society for Perinatal Mental Health, one of the most recognized international societies dedicated to perinatal mental health. This Portuguese Speaking Group intends to provide the opportunity for members to collaborate and share research activities (e.g., basic science, health services research) and interventions that have been made in all aspects of the mental health of mothers, fathers and babies around the time of childbirth with colleagues from Portuguese-speaking countries[3].

2.2.1. Screening tools

There are no standard procedures for an effective psychosocial assessment, but current best practice points suggest the use of methods that are reliable and acceptable, easy to complete and interpret, and that can be integrated within local care models (Austin & The Marcé Society Position Statement Advisory Committee, 2014). A number of screening tools have been developed for the identification of depression (with the EPDS being the most widely used) (Myers et al., 2013) as well as numerous psychosocial assessment tools for identifying risk for perinatal mental health difficulties (Johnson et al., 2012). Specifically in the context of PPD, the strategies developed to improve its detection can be grouped into five-broad categories (Hewitt et al., 2009): (1) postpartum screening using specific standardized questionnaires (e.g., EPDS); (2) postpartum screening using generic standardized questionnaires of depression (e.g., Beck Depression Inventory); (3)

[3] For more information, please visit the website https://marcesociety.com/

prenatal screening using standardized depression questionnaires to identify those women who are at risk for or present current depressive symptoms; (4) prenatal screening of risk factors for PPD to identify more vulnerable women to PPD development; and, (5) training packages targeted at health professionals to promote awareness and recognition of PPD symptoms and ensure thorough psychosocial assessment. Accordingly, a clear distinction is made between the assessment of *current* depressive symptoms (PPD screening) and the assessment of risk for *later* development of PPD (PPD prediction).

Because "with prediction comes the opportunity for prevention" (Cantwell & Smith, 2008, p. 22), there has been an increasing interest in the development of tools based on risk factors to predict women likely to develop PPD. However, although highly acceptable to both women and health professionals (e.g., Austin, Colton, Priest, Reilly, & Hadzi-Pavlovic, 2013), most of the available instruments did not reach sufficient evidence to be recommended for PPD prediction because of their lack of predictive power, which is possibly explained by the non-consideration of potential risk factors across both pregnancy and after childbirth (for reviews see Austin & Lumley, 2003 and Johnson et al., 2012). Moreover, it should be noted that most of the "psychosocial assessment tools are not targeting a single condition, and thus, it is challenging for these tools to have acceptable psychometric properties or be tested against diagnostic criteria such as the DSM system (American Psychiatric Association, 2013) for single diagnostic categories" (Austin, Fisher, & Reilly, 2015, p. 125). Likewise, despite the recent encouraging developments in this area in Portugal, current tools still entail important limitations (i.e., exclusive prenatal administration, limited coverage of main risk factors for PPD, excessive length; Pereira et al., 2016). Furthermore, the lack of a reliable risk-based predictive tool can explain, along with other reasons, the absence of systematic psychosocial assessment in many countries (Milgrom et al., 2008), such as in Portugal.

Despite the multiplicity of factors possibly involved in the etiology of PPD, which are likely to occur in both the pre and postpartum period, the accurate ascertainment of which women would (or not) develop PPD is not an error-free task. The development of evidence-based multidimensional tools to be administrated across time periods (prenatal and postpartum) may maximize prediction potentialities of the instruments. The Postpartum Depression Predictors Inventory-Revised (PDPI-R; Beck, 2002; Beck et al., 2006) constitutes a worthy example of this approach, with promising evidence for its usefulness as reported by women (Ikeda & Kamibeppu, 2013) and midwifes and nurses

(Hanna, Jarman, Savage, & Layton, 2004), as well as predictive validity in many countries, including USA (original version; Beck et al., 2006; Records, Rice, & Beck, 2007), Italy (Oppo et al., 2009), Japan (Ikeda & Kamibeppu, 2013) and Korea (Youn & Jeong, 2011). Preliminary analyses of the instrument have also recently been conducted in Spain (Rodríguez-Muñoz et al., 2017) and Mexico (Ibarra-Yruegas, Lara, Navarrete, Nieto, & Valle, 2018), which, taken all studies together, attest for its cross-cultural applicability. The translation and validation of the PDPI-R into the European Portuguese Language constitutes one of the main objectives of this research project.

3. *Theirs*: Transition to parenthood in couples

The couple's relationship is the type of close relationship most studied during the transition to parenthood and the literature has generally addressed two main topics in this context: (a) whether couple or partner-related factors work as a resource or as a vulnerability factor for individuals' adjustment to the transition to parenthood (transition to parenthood as a "we affair") and (b) the extent to which women's PPD affects the other partner and the couple as a whole, that is, the interpersonal context of PPD, including the role of partners in relation to women's perinatal mental health (postpartum depression as a "we affair").

3.1. Transition to parenthood as a "we affair": From an individual to a couple-based approach

A supportive marital relationship may act as a protective resource when dealing with normative life transitions (Røsand, Slinning, Eberhard-Gran, Røysamb, & Tambs, 2012). In the context of the transition to parenthood, a growing body of research has been dedicated to identifying the links between partner-related factors and individual adjustment (particularly psychological distress), and a recent review (Pilkington, Milne, Cairns, Lewis, & Whelan, 2015) has synthesized this literature. Conclusions from this review revealed that a variety of relationship constructs, namely relationship satisfaction and partner support, are associated with lower perinatal emotional distress. The authors pointed out important limitations of existing studies such as the predominant focus on women and depressive symptoms and the use of cross-sectional designs. In addition, the term "partner support" – which has been the focus of increased perinatal research over

the past years – has been broadly and unclearly defined across studies as well as examined within the broader context of risk factors (rather than as the central topic), which therefore difficult the translation of current evidence into concrete intervention strategies (Mickelson & Biehle, 2017; Pilkington, Milne, et al., 2015).

Some few exceptions have assessed distinct components of partner's support (e.g., Dennis & Ross, 2006) as well as the bidirectional links between relationship variables and depressive and anxiety symptoms across the transition to parenthood (e.g., Figueiredo et al., 2018; Whisman, Davila, & Goodman, 2011). The few studies inclusive of men revealed that certain characteristics of the couple (e.g., relationship satisfaction, positive/negative interactions, partner support) are also linked to men's perinatal psychological symptoms (Don & Mickelson, 2012; Wee et al., 2011): while some studies showed that the associations between relationship variables and psychological adjustment hold similarly for women and men (e.g., Figueiredo et al., 2018; Parfitt & Ayers, 2014; Røsand et al., 2012), others suggest that these variables, including partner's characteristics, may be stronger predictors for women's (e.g., Matthey, Barnett, Ungerer, & Waters, 2000; Morse, Buist, & Durkin, 2000) or men's (e.g., Anding, Rhörle, Grieshop, Schücking, & Christiansen, 2016; Dudley, Roy, Kelk, & Bernard, 2001) postpartum psychological adjustment. However, most of the research suggesting gender-specific predictors for depressive/anxiety symptoms has conducted separate analyses for women and men, typically through classical regression analyses, rather than modeling both partners' outcomes simultaneously (e.g., through structural equation modeling [SEM] approach); this therefore difficult capturing the interdependent nature of couple's data and drawing solid conclusions about whether certain aspects of the couple's relationship are more salient to one partner than the other (Ackerman, Donnellan, & Kashy, 2010; Kenny, Kashy, & Cook, 2006).

To date, an individual-oriented perspective has been privileged. That is, the majority of the interpersonal constructs have been studied by examining members of a couple separately, with most studies taken into account predominantly the woman's perspective (i.e., the associations between her perception of the couple's relationship and her adjustment) (Mickelson & Biehle, 2017). The transition to parenthood can no longer be viewed (and studied) only from the point of view of one partner but rather as a period of life that comprises, besides personal concerns, multiple changes that need to be faced together by both partners (Cowan & Cowan, 2000). Consonant with this approach is the wide recognition that the psychological adjustment of partners in a couple is not

independent from one another (Anding et al., 2016; Don & Mickelson, 2012; Wee et al., 2011), which highlights the importance of viewing women and men as part of a dyad. In addition, although traditional gender roles remain salient after the birth of a child (Katz-Wise, Priess, & Hyde, 2010; Perales, Jarallah, & Baxter, 2018) – reinforced by the still current mother-baby-oriented context of care and strong assumptions about masculinity and fatherhood (Mander, 2004; Taylor, Billings, Morant, & Johnson, 2018) – there are significant sociocultural shifts toward a greater involvement of men in childcare and family life (Cabrera et al., 2018; Eggebeen et al., 2013), including in Portugal (e.g., extended paternal, and shared parental, leave; Ramos, Atalaia, & Cunha, 2016; Wall et al., 2017). Accordingly, the challenges of having a baby could nowadays be perceived as more similar than different between members of a couple (Crespi & Ruspini, 2015; Dribe & Stanfors, 2009) – *a parenthood likely to be in transition too*.

Within this dyadic approach, the role of partner's support could no longer be examined solely from the women's perspective, as both partners can be the providers and recipients of support (Don & Mickelson, 2012; Ryon & Gleason, 2018). For this reason, besides the relevance of the support provided by women on their partner's adjustment and overall transition to fatherhood (e.g., Beestin, Hugh-Jones, & Gough, 2014; Don & Mickelson, 2012; Schoppe-Sullivan, Settle, Lee, & Dush, 2016), the similarity/reciprocity on supportive behaviors within a couple could also play an important role. According to equity theory (Hatfield, Rapson, & Aumer-Ryan, 2008; Walster, Walster, & Berscheid, 1978), the more both partners contribute to and receive benefits from the relationship equitably the most satisfied they are in their relationship. Consequently, along with the importance of an equitable division of household labor and childcare tasks during the transition to parenthood that has been demonstrated (e.g., Chong & Mickelson, 2016; Dew & Wilcox, 2011), one can also expect that reciprocal support exchanges would influence partners' adjustment. In support of this, Ryon and Gleason (2018) recently demonstrated that when first-time parents perceived higher reciprocity in the emotional support provided and received, they reported less negative mood. While broadly examined in the couple literature (e.g., Bar-Kalifa, Pshedetzky-Shochat, Rafaeli, & Gleason, 2018; Iafrate, Bertoni, Margola, Cigoli, & Acitelli, 2012), the potential benefits of supportive reciprocity in the perinatal context remain overlooked.

Based on the fact that romantic relationships involve always two individuals, methodological improvements in dyadic research have been observed in the past few years

and are reflected in more sophisticated research designs and data analytical methods (Ledermann & Kenny, 2017). The collection of data from both partners and, most importantly, the analysis of the data without ignoring the interdependence within a couple, have been largely advised (Ackerman et al., 2010; Kenny et al., 2006; Pietromonaco, Uchino, & Schetter, 2013). In this context, the Actor-Partner Interdependence Model (APIM; Cook & Kenny, 2005) is one of the dyadic models mostly used in dyadic research, as it is of easy implementation and allows to simultaneously estimate whether each partner's adjustment depend on one's own perceptions/behaviors (named actor effects) *and* on the other partner's perceptions/behaviors (named partner effects), taking into account the associations between partner's outcomes. Moreover, gathering data from both members of the couple facilitates the computation of dyadic indexes (Kenny et al., 2006), which allows to examine the effects of couple-level characteristics such as within couple's similarity on a given variable (e.g., personality, emotional suppression; Luo et al., 2008; Velotti et al., 2016).

However, despite some few exceptions (e.g., Figueiredo et al., 2018; Ryon & Gleason, 2018), such advances have not been systematically integrated into perinatal mental health research. The slower research progress toward a more couple-focused research in the perinatal context could be explained by methodological challenges (e.g., difficulty in recruiting men in family research, high rates of men's missingness, difficulty in retaining both members of the couple in longitudinal studies; Costigan & Cox, 2001; Tagliabue & Donato, 2015; Wittenborn, Dolbin-MacNab, & Keiley, 2013) and conceptual issues (e.g., gender ideologies surrounding motherhood and fatherhood; non-consideration of a solid relationship-based theory that guide the research questions, objectives and hypotheses; Cabrera et al., 2018; Pietromonaco et al., 2013), as discussed later in this chapter.

3.2. Postpartum depression as a "we affair": From evidence to practice recommendations

Over the past few decades, several studies have strengthened the view that PPD exerts a considerable burden in the whole family and particularly in the non-depressed partner. The challenge in balancing PPD-related stressors (e.g., uncertainty of daily life, unequal division of responsibilities) and normative developmental tasks of this period put

women's partners at increased risk for emotional impairments themselves (Roberts et al., 2006) as well as strains in their own fathering, which is experienced as solitary and overwhelming (Beestin et al., 2014). Qualitative research is consistent showing that partners of women with PPD significantly experience fear, confusion, concern for their wives, guilt, isolation, exhaustion and stigma; they often do not understand their wives' experience of PPD and subsequently feel unable to help them in the recovery process, which lead to feelings of frustration and helplessness. Moreover, this experience is exacerbated by the fact that women with PPD have generally more difficulties in adequately expressing their needs and thus to receive appropriate support. Consequently, this may contribute to increased stress in the couple's relationship, namely dysfunctional communication and decreased intimacy. In turn, marital strains may reduce the couple's ability to cope effectively with PPD, which may further exacerbate women's depressive symptomatology (Davey et al., 2006; Meighan, Davis, Thomas, & Droppleman, 1999; Tammentie et al., 2004; Westall & Liamputtong, 2011). Difficulties in the couple's relationship, including marital dissatisfaction and lack of partner's support, have therefore been consistently identified as a stressor for (e.g., Boyce & Hickey, 2005; Milgrom et al., 2008) and an outcome of (e.g., Feeney, Alexander, Noller, & Hohaus, 2003; Whisman et al., 2011) PPD symptoms.

Overall, assessing the point of view of both partners has contributed to a richer overview of the interpersonal context in which PPD occurs. Specifically, it is consensual that interpersonal processes between partners are key factors in the development and maintenance of PPD when maladaptive, while may represent a protective factor against PPD when positive (Banker, 2015). Even when women already suffer from PPD, the conceptualization of the dyad and ultimately the partner as a valuable resource has been illustrated in various studies showing that women turn primarily to their partners for support when facing perinatal distress (Henshaw et al., 2013; Holopainen, 2002; Tammentie et al., 2004), and that partners have a central role in encouraging women to seek professional help to cope with their symptoms (Fonseca & Canavarro, 2017) and facilitating their recovery from PPD (Grube, 2005; Misri, Kostaras, Fox, & Kostaras, 2000).

This body of evidence has motivated considerable interest about the inclusion of partners in women's perinatal mental health care (Taylor et al., 2018) and ultimately originated practical recommendations to be implemented with couples in the context of women's PPD (e.g., Cohen & Schiller, 2017; Letourneau et al., 2012). However, these

proposals were not based on a comprehensive review of the available evidence in this specific domain, which would more robustly inform about the utility of including partners. For example, meta-analytic reviews gathering clinical trials that tested the efficacy of couple-based interventions for depression in the general population supported the benefits of such approaches in reducing depressive symptomatology and, particularly, in improving marital distress (Barbato & D'Avanzo, 2008). Similarly, in the perinatal context, some psychological and psychosocial interventions targeting the prevention and treatment of PPD in women have also included the woman's partner in the intervention process (e.g., Brandon et al., 2012; Matthey, Kavanagh, Howie, Barnett, & Charles, 2004; Misri et al., 2000). Thus, a further and important step in this area calls for the integration and systematization of knowledge into best practice recommendations regarding the involvement of partners, namely if and how they should be involved, in intervention approaches for PPD in women. This will be one of the goals of this research project.

3.3. Conceptual models applied to close relationships

A variety of theories have been proposed to study the responses and coping strategies that couples use when dealing with potentially stressful situations. Two theories – not mutually exclusive – have particular relevance in the context of the transition to parenthood: the systemic-transactional model and adult romantic attachment.

3.3.1. The systemic-transactional model (STM)

The transition to parenthood includes a wide range of potentially stress-inducing situations that members of a couple need to manage as individuals and as a couple. According to Bodenmann (2005), couples can cope with stress by (a) engaging in individual coping, (b) seeking social support, and (c) engaging in dyadic coping (DC). Specifically in the context of the transition to parenthood, coping has mainly been studied at the individual-level (i.e., how individuals cope with their own stress) either among women (for a review of studies conducted during pregnancy see Guardino & Schetter, 2014) or men (e.g., Johnson & Baker, 2004; Soliday, McCluskey-Fawcett, & O'Brien, 1999). Likewise, the literature focused on social support from others (e.g., family members, friends) is abundant, and generally shows the benefits of perceived social support on individuals' adjustment (e.g., Emmanuel, St John, & Sun, 2012; Webster, Nicholas, Velacott, Cridland,

& Fawcett, 2011). On the other hand, although partner's support has been largely studied during the transition to parenthood, as noted, it is surprising the scarcity of studies investigating the role of DC – an interrelated but distinct concept from general partner support – as operationalized by the systemic-transactional model (STM[4]; Bodenmann, 1995, 2005; Bodenmann et al., 2017; Bodenmann et al., 2016).

The STM represents an extension of Lazarus and Folkman's (1984) transactional individual-oriented model of coping, by shifting its focus to the experience of stress and coping in couples. The principal assumption of the STM is that the stress experienced by one partner always influences the other partner in a committed relationship and the coping resources of each partner are interlinked. The STM assumes therefore a systemic perspective, highlighting that the wellbeing and relationship satisfaction perceived by both partners are mutually intertwined. Central to this model is the concept of dyadic stress, which (a) occurs either in situations of direct (when both partners are faced with the same stressor) or indirect (when one partner's stress spills over into the couple and thus affects the other partner) stress; (b) can result from within (internal stress such as health problems, marital conflict) or outside (external stress such as problems in the workplace) the couple's relationship; and (c) can affect both partners simultaneously or at different time points (e.g., in a sequential way).

The transition to parenthood could be conceptualized as a dyadic stressor, affecting both partners at the same time and concerning them as a unit (McGoldrick & Carter, 2003; Perry-Jenkins & Claxton, 2011). In fact, even when partners experience personal concerns at some point (e.g., physical changes or pain related to the pregnancy, work-family conflict among men), these can have a serious impact on the other and the couple as a whole (i.e., crossover effects within the couple; Westman, 2011). During this transition, couples not only have to manage challenges within their relationship as a couple (e.g., changing roles within the relationship, less time spend together, loss of intimacy; Delicate et al., 2018; Entsieh & Hallström, 2016), but also need to cope with multiple daily external stressors (e.g., childcare demands, work-family conflicts, potential disagreements with family of origin). Indeed, most challenges that couples must deal with (i.e., direct or

[4] Other conceptual models of interpersonal coping have been developed in the last 30 years such as the Relationship-Focused Coping Model (Coyne & Smith, 1991), the Developmental-Contextual Model of Dyadic Coping (Berg & Upchurch, 2007), the Empathic Coping Model (DeLongis & O'Brien, 1990), and the Congruence Model (Revenson, 1994); for a brief overview, see Bodenmann, Falconier, and Randall, 2017 and Bodenmann, Randall, and Falconier, 2016.

indirect dyadic stress) result from outside the couple's relationship (external stress) and they need to address them together to avoid tensions and arguments within the couple (internal stress) (Bodenmann, 2000).

When one partner communicates stress to the other, a shared and interdependent process of coping (DC) is activated. As illustrated in Figure 1, the STM posits that this process involves 1) communication of stress appraisals of partner A to partner B either through verbal (e.g., more or less explicit demands for partner's emotional support by describing emotions and thoughts or asking for problem-related information, advice, or help) and/or non-verbal (e.g., signs to express emotional distress such as irritated tone of voice, sighing and closed body position) strategies; 2) perception, interpretation and decodification of the stress signals by partner B; and, 3) verbal and nonverbal coping reactions by partner B, who may either ignore the partner's signals of stress (absence of stress appraisal), become stressed too (stress contagion), or engage in DC behaviors to help the other partner dealing with stress (partner-oriented behaviors).

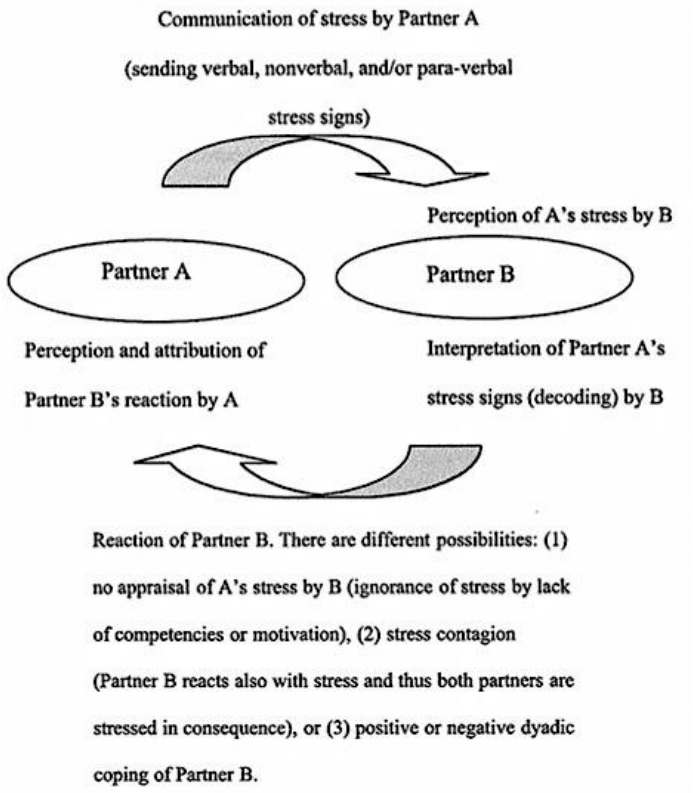

Figure 1 | STM: Process of stress communication of one partner and DC of the other partner (Bodenmann, 2005, p. 37, reproduced with permission from the author)

Similarly to the individual-centered model of Lazarus and Folkman (1984), the STM differentiates between primary (appraisals of the situation) and secondary appraisals (appraisals of the resources to cope with the situation) that can be further distinguished into more specific forms of appraisal, which take into account interpersonal aspects (see Figure 2). The primary appraisals include: evaluation of the significance of the situation for the individual (1a-appraisal; comparable to the original conceptualization of primary appraisal by Lazarus and Folkman), evaluation of the non-stressed partner whether the situation is stressful for the partner and vice-versa (1b-appraisal), both partners evaluation of whether the other partner has recognized one's appraisal (1c-appraisal) and comparison between partners' appraisals (1d-appraisal; "we-appraisal"). The secondary appraisals take three forms: individual evaluation of one's own resources to cope with the stressor (2a-appraisal), partner's evaluation of the other's resources (2b-appraisal), and we-appraisal regarding resources (2c-appraisal). Based on these appraisals, partners define individual, partner-related or joint goals, which, in turn, lead to parallel coping reactions (individual, partner-related or couple-related behaviors).

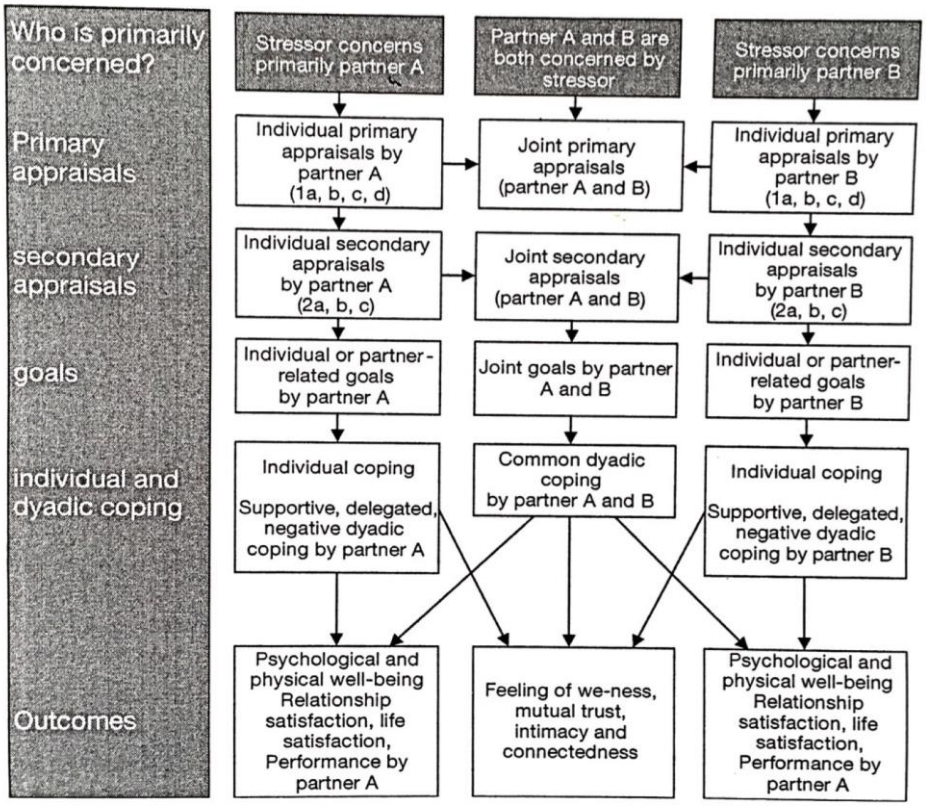

Figure 2 | STM: Appraisal processes and goals (Bodenmann et al., 2016, p. 9, reproduced with permission from the author)

Along with individual coping and social support from others, Figure 3 displays the different forms of DC as operationalized by the STM. Such forms can be positive or negative and can be emotion-focused (regulation of the emotional response to the stressor) or problem-focused (direct management of the stressor). As positive DC behaviors, Bodenmann (2000) proposed supportive (e.g., giving advice or searching for practical solutions with the partner, helping the partner to reframe the situation, showing understanding and empathy), delegated (i.e., occurs when one partner explicitly asks the other partner to take over a given task in order to relieve his/her stress) and common DC, which refers to the way that partners cope together with shared stressors. It includes couple-oriented behaviors such as searching for information or solutions of the problem together, sharing thoughts and feelings, and mutual tenderness. Negative DC can assume three forms: hostile, ambivalent and superficial DC. The first form of DC includes open disinterest in supporting the partner, by blaming, criticizing, or ridicularizing the partner. In ambivalent DC, the partner might engage in some supportiveness but in a reluctant or unmotivated way, as if the provision of support was burdensome or unnecessary. Superficial DC occurs when one partner provides support in an unresponsive way, with no real empathy or understanding, overlooking partner's current needs.

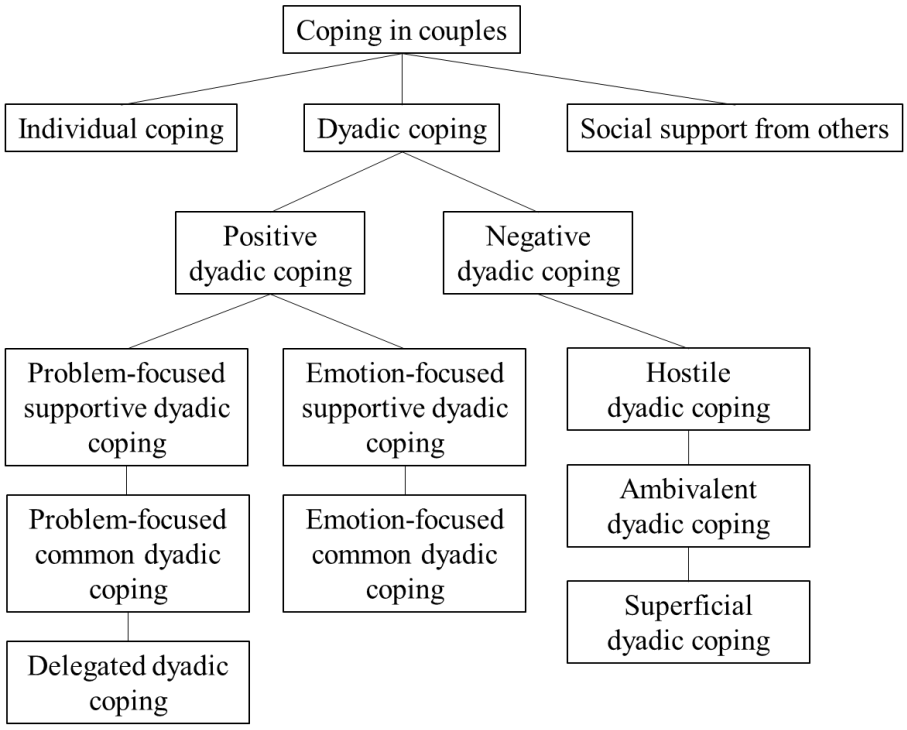

Figure 3 | STM: Forms of DC (Bodenmann, 2005, p. 38, reproduced with permission from the author)

Positive forms of DC are important to reduce stress (i.e., restoration of individual and couple homeostasis) and foster intimacy and relationship quality (e.g., perception of the partner as trustful and reliable, feelings of "we-ness" and togetherness) – the two main functions of DC (Bodenmann, 2005; Cutrona, 1996) – whilst persistent negative DC has consistently been acknowledged as dysfunctional coping. In an ideal situation, whether the stressor is experienced by only one partner (individual appraisals of stress) or both partners (common appraisals of stress), both partners are actively involved in order to promote each other's wellbeing and relationship satisfaction (i.e., one's partner stress reduction would also assure the other's partner wellbeing due to the interdependence within a couple).

Couple's engagement in DC is hypothesized to be moderated by several factors, namely individual-related (e.g., both partners motivation such as the level of commitment for the relationship; the nature of their goals; their general and situational coping resources) and stressor-related (e.g., origin of stress and timing of occurrence; whether the stressor affects both partners simultaneously vs. at different times) (Bodenmann et al., 2017; Bodenmann et al., 2016). Moreover, Bodenmann (2005) suggests that the stress-coping process follows a typical temporal order: DC efforts generally follow unsuccessful individual coping strategies, and social support follows unsuccessful DC, as a stress-coping cascade.

3.3.1.1. Empirical evidence of the STM

Originally developed in the context of daily stress (minor stressors), the STM has been internationally applied and expanded to multiple contexts (e.g., major stressors; chronic illness, mental disorders) (Bodenmann et al., 2016) and cultures (for a review see Falconier, Randall, & Bodenmann, 2016). Moreover, it has been supported by a large body of empirical evidence (Staff, Didymus, & Backhouse, 2017), and is considered a valuable framework to guide interventions in community and clinical contexts (Bodenmann & Randall, 2012), whose efficacy has been recognized (Bodenmann, 2016; Bodenmann et al., 2008). DC has consistently been found to be a robust predictor of relationship functioning, and recent research added evidence regarding its role for individual wellbeing (for reviews see Falconier, Jackson, Hilpert, & Bodenmann, 2015 and Staff et al., 2017). In the context of minor stressors, supportive and common DC have been found to be equally important

for relationship quality (e.g., Bodenmann, Pihet, & Kayser, 2006), while common DC has revealed to be more relevant in managing major stressors, such as cancer (e.g., Badr, Carmack, Kashy, Cristofanilli, & Revenson, 2010; Rottmann et al., 2015). Regarding individual adjustment, overall, lower levels of negative DC and higher levels of supportive and common DC have been associated with fewer depressive and anxiety symptoms in both community (e.g., Bodenmann, Meuwly, & Kayser, 2011) and severe illness (e.g., Rottmann et al., 2015) contexts, as well as higher QoL in the later context (e.g., Meier, Bodenmann, Mörgeli, & Jenewein, 2011; Vaske et al., 2015). Moreover, stress communication has been found to be either functional (Vaske et al., 2015) or somewhat prejudicial (Meier et al., 2011) for partners' adjustment in the context of chronic illness. In fact, the adaptiveness of DC for the couple seems not be universal in the context of severe health conditions, as previous research shows that components of the STM (e.g., delegated DC, common DC) may not be equally adaptive for the patient and the caregiver (e.g., Badr et al., 2010; Rottmann et al., 2015). Recently, studies have examined the role of DC among parents, with initial evidence suggesting a positive impact of DC on co-parenting relationships (Zemp, Milek, Cummings, & Bodenmann, 2017), in the adjustment of couples parenting children with Autism Spectrum Disorder (García-López, Sarriá, Pozo, & Recio, 2016), as well as in children's development (Zemp, Bodenmann, Backes, Sutter-Stickel, & Revenson, 2016).

The application of the STM to the transition to parenthood is a more recent and underexplored research field but several reasons justified its adoption as the main theoretical framework of the present research. First, it is a general model of interpersonal coping that can be applied in distinct contexts, including the transition to parenthood. Second, given the model's emphasis on reciprocity and mutuality between members of a couple, it is very useful to attest for the dyadic interdependence that characterizes the transition to parenthood. Specifically, as several stressors of this period are likely to be appraised as concerning both members of the couple (i.e., transition to parenthood as a "we stress" period rather than an exclusively individual transition for women and men), the impact of joint coping efforts on partners' adjustment deserves special attention in perinatal research. Third, it identifies specific forms of stress communication and DC as well as conditional factors of the DC process, which allows the design of concrete

hypothesizes to be empirically tested[5] and consequently inform clinical practice about concrete targets in the couple's relationship. Particularly, a better understanding of the process of stress communication during the transition to parenthood is also of special relevance because of (a) the multiple changes and reorganizations characteristic of this period (which inevitably lead to increased stress-related self-disclosure and requests of support), as well as (b) the fact that interpersonal relationship skills (e.g., skills to communicate effectively and to ask for help in time of need) may contribute more for couples' adjustment to the birth of a child than their social network (Ketner et al., 2018). Finally, the STM has large empirical evidence, attesting for the role of DC on a wide range of adjustment indicators (individual and marital) in distinct backgrounds (daily hassles and major critical life events). The single published study that was conducted during the transition to parenthood revealed, in a sample of first-time Italian parents, that DC was concurrently associated with higher levels of dyadic adjustment but no significant association was found between DC and depressive symptoms during pregnancy (Molgora, Acquati, Fenaroli, & Saita, 2018; Molgora, Fenaroli, Saita, & Acquati, 2018). A better understanding of the role of DC during the transition to parenthood is one of the goals of this research project.

3.3.2. Adult romantic attachment

According to adult attachment theory (Mikulincer & Shaver, 2016), the way individuals appraise and cope with potentially stress-inducing events, such as the birth of a child, is likely to be influenced by their (in)secure attachment representations (Simpson & Rholes, 2017, 2018). Research on adult attachment commonly conceptualizes individual differences in attachment along two dimensions: anxiety (the extent to which individuals worry about loss or abandonment by their romantic partners) and avoidance (the extent to which individuals feel discomfort with dependence and emotional intimacy in relationships). While low levels of both anxiety and/or avoidance reflect more secure attachment representations, high levels of anxiety and/or avoidance reflect more insecure attachment representations (Brennan, Clark, & Shaver, 1998). Insecure attachment representations (i.e., representations of the self as unworthy of love and care and/or

[5] This is facilitated by the use of the Dyadic Coping Inventory (DCI; Bodenmann, 2008), which assesses the key components of the STM considering individual and dyadic perceptions.

representations of the other as unresponsive) are viewed as a diathesis that may impair intra and interpersonal outcomes, while secure representations act as a resource that promote adjustment (Simpson & Rholes, 2017, 2018). Attachment representations can be generalized or specific for particular close relationships (with parents, friends, and romantic partner; Fraley, Heffernan, Vicary, & Brumbaugh, 2011). Romantic relationships are classical adult attachment relationships (Hazan & Shaver, 1987), which justifies the wide research that investigated the role of romantic attachment in a variety of contexts, including the transition to parenthood.

3.3.2.1 Adult romantic attachment and the transition to parenthood

Based on the Attachment Diathesis-Stress Process Model (Simpson & Rholes, 2017), Simpson and Rholes (2018) posited that real or perceived stressful circumstances during the transition to parenthood are likely to activate romantic attachment representations (anxiety and avoidance), which, in turn, influence perceptions, emotions and behaviors related to the partner. For instance, individuals with more anxious representations are likely to engage in intense and persistent behaviors that promote proximity in their relationship in order to reduce stress (emotion-focused/hyperactivating coping strategies), while individuals with more avoidant representations tend to deal with stress in an independent manner (e.g., by distancing themselves cognitively or behaviorally from the stressor; avoidant/ deactivating coping strategies). In contrast, individuals with more secure representations towards their romantic partners are likely to use problem and relationship-focused coping strategies, which includes requesting support from their partners if necessary. These attachment-related processes are, in turn, important determinants of individuals' adjustment (e.g., emotional, dyadic) to the situation.

Several pathways of the Attachment Diathesis-Stress Process Model have received empirical evidence, with research showing associations between more insecure (high anxiety and/or avoidance) attachment representations and more depressive symptoms (Rholes et al., 2011; Warfa, Harper, Nicolais, & Bhui, 2014), more difficulties in adjusting to parenthood (Kazmierczak, 2015), expressed in increased parenting stress (Howard, 2010; Schoppe-Sullivan et al., 2016; Trillingsgaard, Elklit, Shevlin, & Maimburg, 2011) and reduced parental confidence or efficacy (Howard, 2010; Kohlhoff & Barnett, 2013) as well as diminished relationship satisfaction (Kohn et al., 2012; Rholes, Simpson, Campbell, &

Grich, 2001). Some moderators of these relationships have also been identified (e.g., levels of partner support, interference of caregiving activities on work and personal lives, family demands; Kohn et al., 2012; Rholes et al., 2011), and reflect the core concerns of more anxious and avoidant individuals susceptible to be triggered during this period of life – unavailability of partner support and lack of autonomy/independence, respectively (Simpson & Rholes, 2018). Notwithstanding this important knowledge, the potential dyadic processes that may explain *how* attachment can contribute to positive or negative adjustment outcomes in the transition to parenthood remain unclear.

3.3.2.2. Adult romantic attachment, dyadic processes and adjustment: A call for more integrated models

It is widely recognized that romantic attachment affects how individuals relate to their romantic partners during times of stress (Simpson & Rholes, 2017, 2018), especially how they seek help when they are stressed (support-seeking) and how they perceive their partner's efforts of support (perceptions of support received) as well as how they help their distressed partners (support-giving). Indeed, the links between romantic attachment and supportive-related processes within couples are well-established (e.g., Collins & Feeney, 2000, 2004; Feeney & Collins, 2001; Simpson, Rholes, & Nelligan, 1992; Simpson, Rholes, Oriña, & Grich, 2002), and recent studies added evidence with regard to the negative associations between insecure romantic attachment and DC (Batinic & Kamenov, 2017; Fuenfhausen & Cashwell, 2013; Levesque, Lafontaine, & Bureau, 2017). On the other hand, supportive romantic relationships have been broadly and consistently considered one of the most important resources for partners' adjustment and health in a variety of contexts (Braithwaite & Holt-Lunstad, 2017; Pietromonaco & Collins, 2017). Nevertheless, research focused on the links between close relationships and health-related outcomes has been limited by the absence of a theoretical framework such as adult attachment theory (Pietromonaco et al., 2013).

Pietromonaco et al. (2013) proposed a conceptual attachment-based framework to examine the links between dyadic relationship processes and health-related outcomes. This model includes the specification of several pathways originated from the major construct (romantic attachment) and how it influences dyadic processes (i.e., relationship behaviors such as support-related processes, and relationship mediators and outcomes

such as relationship satisfaction). This conceptual framework further elaborates on a range of possible bidirectional links between these dyadic processes and physiological responses, affect and health behavior as well as health and disease outcomes. In addition, it assumes a dyadic perspective, by incorporating reciprocal links between each partner's processes, behaviors and outcomes. The authors underscore that this is a general framework that can be accommodated for testing specific relationship constructs and adjustment outcomes, as well as be extended to several health domains (e.g., chronic disease, transition to parenthood).

Common to both the diathesis-stress model (Simpson & Rholes, 2017, 2018) and Pietromonaco and colleagues' framework (2013) is the general idea that attachment representations influence perceptions and behaviors in a romantic relationship, which, in turn, facilitate or impair a healthy adjustment. The second model is dyadic in essence and explicitly addresses how attachment and dyadic processes influence health-related processes and outcomes, pointing out to the value of examining the mediators of these relationships. Therefore – along with the diathesis-stress model – it is considered a useful approach from which we can derive and test more specific models (namely mediational) in perinatal research. Some few exceptional studies conducted during the transition to parenthood can be understood within this framework, which explored the connections between attachment, partner's support and adjustment outcomes (e.g., Rholes et al., 2011; Rini, Schetter, Hobel, Glynn, & Sandman, 2006), and recent studies have elaborated on potential relationship-related mediators between romantic attachment and partners' adjustment (e.g., empathy, co-parenting support; Kazmierczak, 2015; Schoppe-Sullivan et al., 2016). Notwithstanding these promising advances, a more precise focus on specific relationship processes (rather than perceived partner's support) taking into account both partners' perspectives and interdependence (rather than only the individual) remains overlooked in perinatal research. This will be one of the goals of this research project.

4. Research gaps and current questions

While decades of research have established the relevance of the early detection and primary prevention of depression after childbirth and offered important insights on the associations between the couple's relationship and adjustment to the transition to parenthood, important questions remain to be answered.

4.1. *Hers* transition to parenthood

Despite the extensive literature examining the relationships between certain risk factors and PPD, few studies have: (a) adopted a **prospective longitudinal design**: (b) simultaneously considered a dimensional and a **categorical approach to establish PPD** (i.e., use of screening measures and diagnostic interviews); and (c) examined **whether** a factor/situation that may put women at **risk is likely to vary across the perinatal period** (e.g., whether the lack of social support at pregnancy or postpartum is equally predictive of PPD) (e.g., Lara, Navarrete, & Nieto, 2016; Oppo et al., 2009; Rados, Herman, & Tadinac, 2016). This is particularly relevant for defining the ideal time for enquiring women about psychosocial issues in the current busy maternity care settings. Also, the clarification of the directionality of the associations between risk factors and depressive symptoms would allow to inform about the most relevant factors to be further considered in the prediction of PPD. Therefore, a current challenge concerns the design of future studies on this topic, which should be prospective longitudinal (with multiple times of assessment of risk and PPD) and include more rigorous assessment methods to establish PPD. In the present project, Study II intended to overcome these gaps.

Moreover, despite highly advocated (Pereira et al., 2016), the lack of a holistic and integrated psychosocial assessment to account for the presence and/or risk for perinatal mental health disorders in Portuguese health care settings could be attributable to the lack of a reliable and comprehensive instrument to assess psychosocial risk factors. The translation and adaptation of the PDPI-R to the European Portuguese language, including tests of its predictive validity in a sample of Portuguese women, would be an important first step towards the implementation of effective screening. In the present research project, Study I and II have addressed these objectives.

4.2. *Theirs* transition to parenthood

Several conceptual and methodological research gaps can be summarized within the couple-focused perspective of the transition to parenthood.

4.2.1. Conceptual gaps

First, as opposed to internalizing symptoms, particularly depressive symptoms, which have been the main focus in the selection of individual adjustment indicators, **the assessment of positive outcomes** such as QoL **has been more neglected in perinatal research** (Ngai & Ngu, 2013). The importance of conducting a comprehensive assessment during the perinatal period, considering both negative and positive dimensions of functioning, including the mental, physical and social functioning of individuals (i.e., multidimensional constructs), has been previously stressed (Jomeen, 2004). In addition, although distinct dimensions of adjustment are likely to be moderately correlated (e.g., individuals with higher levels of depressive/anxiety symptoms tend to report lower levels of dyadic adjustment and higher levels of parenting stress) they do not overlap, as they may have different main predictors (Ketner et al., 2018) and couples experience changes in distinct domains of adjustment in unique ways (Don, Chong, Biehle, Gordon, & Mickelson, 2014). However, a shift toward a more holistic paradigm has generally not occurred. In the present research, adjustment was operationalized attending to three levels – individual, marital and parental[6] – and considering both positive (e.g., QoL, parental confidence) and negative (e.g., depressive symptoms, parenting stress) dimensions of functioning, in order to understand the adjustment to the transition to parenthood at a multidimensional level. In the present research (Studies III to VI), these three levels of adjustment were addressed.

Second, while the couple's relationship has been viewed as a main variable in the study of determinants of adjustment to the perinatal period for a long time, **most studies have focused on indicators of marital *adjustment*** (e.g., relationship satisfaction) **rather than marital/dyadic *processes*** (e.g., DC) **as predictors.** While the indicators of adjustment are useful to characterize the impact of an event on couples (in this case, the transition to parenthood), they are limited in informing about specific mechanisms of action and potential modifiable targets in the couple's relationship. Likewise, little research has move beyond the study of perceived partner support in its broad terms to explore other forms of supportive processes such as common DC, which are of special relevance during the transition to parenthood. This research gap could be justified by the fact that

[6] Parental adjustment comprises women/men's perceptions related to the parent-child dyad (e.g., perceived parenting difficulties and competence in childcare tasks), in contrast to women/men's perceptions of one's own wellbeing (individual adjustment) and the relationship with their romantic partner (marital adjustment).

few studies have adopted a solid interpersonal framework to guide the operationalization of dyadic constructs and the formulation of hypothesizes and models to be tested. To move forward, efforts should be made towards a greater collaboration between close relationship science theories and health psychology research (which included the transition to parenthood) in order to allow the test of theory-based hypotheses (Pietromonaco et al., 2013).

Among other important questions regarding the couple's functioning during the perinatal period that remain unanswered, one is whether dyadic mechanisms/processes (e.g., DC) explain the links through which interpersonal constructs (e.g., individual differences in attachment) are associated with individual, marital and parental outcomes, and the other concerns the couple's functioning in the presence of depressive symptoms in one of the partners during pregnancy, which has been addressed to a much less extent (Blanchard, Hodgson, Gunn, Jesse, & White, 2009; Figueiredo et al., 2010) compared to the presence of depression after childbirth. Depression during pregnancy is also worthy of attention because it is as common as PPD, frequently predicts PPD onset and is associated with poor fetal/ neonatal outcomes (Pearlstein, 2015). From a prevention perspective, it matters significantly to better understand the vulnerabilities and resources of couples in which one member suffers from high levels of depressive symptoms before childbirth in order to help them entering the postpartum period in a more positive way.

This research overcomes these major limitations, by examining the potential role of clearly defined relationship processes (DC), within relevant theoretical frameworks (the STM and attachment theory). Specifically, in the present project, Study III characterized DC strategies in couples with women with high levels of depressive symptoms during pregnancy; Study IV and Study VI addressed the role of DC (specific dimensions and similarity indexes, respectively) in short and long term adjustment; and, Study V examined the mediating role of common DC on the associations between romantic attachment dimensions and parental adjustment.

Finally, while several systematic reviews of interventions either to prevent or treat PPD in women have been published, **no such work was yet accomplished for partner-inclusive interventions** (i.e., interventions including both the woman and her partner). Furthermore, it is imperative to synthetize the findings of controlled trials to determine, among other aspects, the active ingredients of the intervention (the partner's

participation vs. the content of the intervention vs. both), the optimal type of partner's participation (e.g., number of sessions, alone vs. with women), and the content of the intervention (e.g., education about PPD, communication skills). These issues are important to inform the development of evidence-based guidelines for how to address PPD through a dyadic perspective. In addition, although there has been a gradual increase in men's involvement in their partner's pregnancy and delivery as well as in parenting education classes, including in Portugal, partners of women with perinatal mental health difficulties are generally not supported and included in decisions about women's mental health care (Taylor et al., 2018). Consequently, this work could have direct implications for strengthening men-inclusive health policies strategies in maternity care settings, with consequent benefits for both members of the couple. In this project, we conducted a systematic review of the literature on this topic.

4.2.2. Methodological gaps

First and foremost, until now, **few studies have adopted a dyadic approach** (i.e., considering dyadic effects by assessing relationship processes for both partners, but also the reciprocal influences between them), which may allow to more fully capture how the relationship context, including couple-level factors (e.g., similarity between partners on a given variable), influence one another adjustment outcomes. Importantly, the consideration of the couple as the unit of analysis facilitates direct tests of gender differences, which appear to be generally overvalued due to methodological limitations of the studies (i.e., separate analyses for women and men; Ackerman et al., 2010; Kenny et al., 2006). Overall, as noted, existing perinatal research has scarcely incorporated relationship science frameworks, but also specific dyadic data analytical methods that account for the interdependence between partners (e.g., APIM); therefore, a closer link between both areas of research (dyadic and perinatal mental health), at both conceptual and methodological levels, were privileged in the present research. Indeed, all the empirical studies conducted with couples (Study III to Study VI) considered the couple as the unit of analysis at both conceptual and statistical levels.

Secondly, most studies assessing the effects of relationship variables were cross-sectional and the **few prospective longitudinal studies** covered exclusively the pre or the postpartum period. The mechanisms underlying a positive or negative adjustment,

specifically those involving indirect/mediational pathways, are better understood with longitudinal data, ideally beginning in pregnancy and continuing through the first year after childbirth. Because common to both *hers* and *theirs* transition to parenthood perspectives is the value that this research points on prevention in the perinatal context, this study will contribute to clarify the temporal precedence of potential dyadic effects, comprising the whole perinatal period. In the present project, all but one of the empirical studies conducted with couples adopted a prospective longitudinal study (Studies IV to VI).

Finally, but not less important, since the **majority of perinatal and dyadic research has been conducted with Anglo-Saxon populations**, this research's results contributed to a better understanding of the experience of couples transitioning to parenthood while considering the specific sociocultural reality of Portugal (namely, the current legislation regarding parental leave, organization of the obstetric services, and socioeconomic situation).

Chapter II

Objectives and Method

The work underlying this dissertation is divided in three phases: (I) the Portuguese validation studies of the PDPI-R; (II) the study of interpersonal variables (e.g., dyadic processes) in relation to both women and their partners' adjustment to the perinatal period, considering prospective quantitative longitudinal dyadic data; and, (III) a systematic review addressing the inclusion of partners in interventions targeting women's PPD.

In this chapter, we will present a general overview of the implementation of this PhD research project, namely the main and the study-specific objectives, the common and distinct procedures between research phases I and II, the assessment measures used in the different empirical studies, the rationale regarding the selection of specific statistical procedures, and the ethical considerations that have guided the different stages of our work.

1. Research objectives

Grounded on the state-of-art evidence on the topic of PPD screening, prevention and treatment as well as the couple's relationship during the transition to parenthood considered in chapter 1, this research project addressed some of the research gaps previously identified in these domains, by: 1) testing the validity of a widely used screening tool for Portuguese women; 2) adopting a prospective longitudinal design, covering the prenatal and postpartum periods; 3) considering the couple as the unit of analysis, accounting for the interdependence between members of a couple, defying the traditional women-centered approach; 4) including adjustment outcomes at multiple levels (individual, marital and parental) as well as including both negative (e.g., parenting stress) and positive (e.g., QoL) outcomes; 5) considering the role of dyadic/marital processes on both partners' adjustment, which will inform research and clinical practice of concrete targets in the couple's relationship; and, 6) examining the role of dyadic mediators between well-established associations in the literature (i.e., between adult romantic attachment and couple's adjustment).

The three general objectives of this research project were:

1. To adapt an inventory of risk factors for PPD for the Portuguese population – the PDPI-R – and determine its **predictive validity** in identifying Portuguese women at high-risk for PPD at different postpartum periods and considering different gold standards to establish a diagnosis of PPD.

2. To obtain a comprehensive understanding of the interplay between interpersonal variables and both partners' adjustment during the perinatal period.

2.1. To examine the associations between depressive symptoms and DC during pregnancy.

2.2. To examine and compare both members of the couple's individual, dyadic and parental adjustment outcomes as well as DC strategies throughout time.

2.4. To examine the influence of DC on both partners' adjustment, considering the reciprocal influences between partners (i.e., actor and partner effects) throughout time.

2.4. To characterize both partners' romantic attachment representations and to examine the dyadic processes (e.g., DC) through which they influence different adjustment outcomes in both members of the couple (i.e., mediating effects).

2.6. To characterize the similarity between members of a couple regarding DC strategies and its association with the study outcomes (i.e., couple-level effects).

3. To synthetize the current knowledge about the participation of the male partners in psychosocial and psychological interventions delivered to women targeting PPD, and define evidence-based guidelines and future directions regarding practical (e.g., session's content, type of participation) and methodological (e.g., assessment of partners' attendance) issues in perinatal couple-based research and practice.

Based on the identified research gaps and proposed objectives, six empirical studies and one systematic review were conducted. These are presented in this dissertation in the format of scientific papers (specific details about each study are described in the appropriate section; see Chapter III). Table 2 displays the specific objectives of each study. Empirical study I and II (research phase I) completely addressed the first general objective. Empirical studies III through VI (research phase II) addressed specific objectives within the second general objective. Finally, a systematic review of the literature (research phase III) addressed the third general objective[7].

A distinctive feature of the studies comprising research phase I should be noted. The empirical study I corresponds to a preliminary study, which data were collected in the context of an ongoing postdoctoral project. In this study, we described the translation procedures of the PDPI-R to European Portuguese as well as presented exploratory psychometric analyses in a sample of Portuguese women recruited online and assessed at a single time (pilot study – online cross-sectional survey). In the empirical study II, we examined the predictive validity of the PDPI-R in a sample of Portuguese women recruited in-person and followed across multiple time points (field study – longitudinal design).

Except for the empirical study I, all the empirical studies used data from the broad longitudinal study purposely designed for this research project. Empirical studies I to III and the systematic review are already published in international peer-reviewed journals, while the remaining studies are currently under review.

[7] The research phases I and III of this PhD project are closely linked to the ongoing postdoctoral project aimed to develop and test the efficacy of an online Cognitive Behavioral Therapy-based intervention to prevent PPD in women (Be a Mom: beamom.pt; access to the program is restricted to invitation). On the one hand, the Portuguese adaptation of a screening instrument allows to identifying Portuguese women who could benefit most from the preventive intervention. On the other hand, the focus of the systematic review on the partner and couple's characteristics informs about the development and design of the efficacy studies to be further undertaken within the broader postdoctoral project, which will target the role of the partner's involvement (i.e., comparison of women participating with vs. without their partners in terms of response to the intervention).

Table 1 | Specific objectives of the empirical studies and systematic review

Research phase	Studies	Objectives
I	Empirical study I *Pilot study*	- To assess the preliminary psychometric properties (reliability and construct and convergent validity) of the postnatal version of the PDPI-R in Portuguese women.
	Empirical study II *Field study*	- To assess the capacity of each PDPI-R risk factor assessed prenatally and postnatally in predicting PPD/ symptoms thereof. - To assess the predictive validity of the prenatal and postnatal versions of the PDPI-R to identify Portuguese women at high risk for experiencing PPD in the short and long term. - To establish cut-off scores for both the versions of the PDPI-R.
II	Empirical study III	- To compare the forms of DC and dimensions of dyadic adjustment in couples in which the woman was experiencing high levels of depressive symptoms and in couples in which the woman presented minimal or no depressive symptoms. - To examine the DC process (i.e., the associations between one's own stress communication and their partners' DC responses), separately in both groups of couples, and explore group differences/similarities.
	Empirical study IV	- To examine changes in depressive and anxiety symptoms, QoL and forms of DC from T1 to T2 in both women and their partners. - To examine the effects of DC at T1 on both women and their partners' individual adjustment at T2. - To examine whether changes in DC over time would be associated with changes in both partners' adjustment.
	Empirical study V	- To examine changes in parenting stress and parental confidence from T2 to T3 in both women and their partners. - To examine the mediating role of common DC (T2) on the associations between attachment-related anxiety and avoidance (T1) and parenting stress and parental confidence (T3).
	Empirical study VI	- To examine each partner's perceived similarity and couples' actual similarity in DC at T1 and T2. - To examine the effects of similarity in DC at T1 and T2 on each partner's depressive and anxiety symptoms, dyadic adjustment, and parenting stress at T3. - To compare stereotype adjusted and unadjusted indexes of similarity. - To examine whether the effects of similarity in DC on partners' adjustment would vary in function of stereotype adjustments.
III	Systematic review	- To synthesize the literature on partner-inclusive interventions delivered during pregnancy and/or postpartum and designed to prevent or treat PPD in women.

Note. T1 = second trimester of pregnancy; T2 = 6 weeks postpartum; T3 = 6-9 months postpartum.

2. Method

2.1. Research project design

This research project used a prospective longitudinal quantitative design, which means that participants provided data (mainly through self-report datasheets and questionnaires) at three (research phase I) or four (research phase II) times across the perinatal period (see Figure 1).

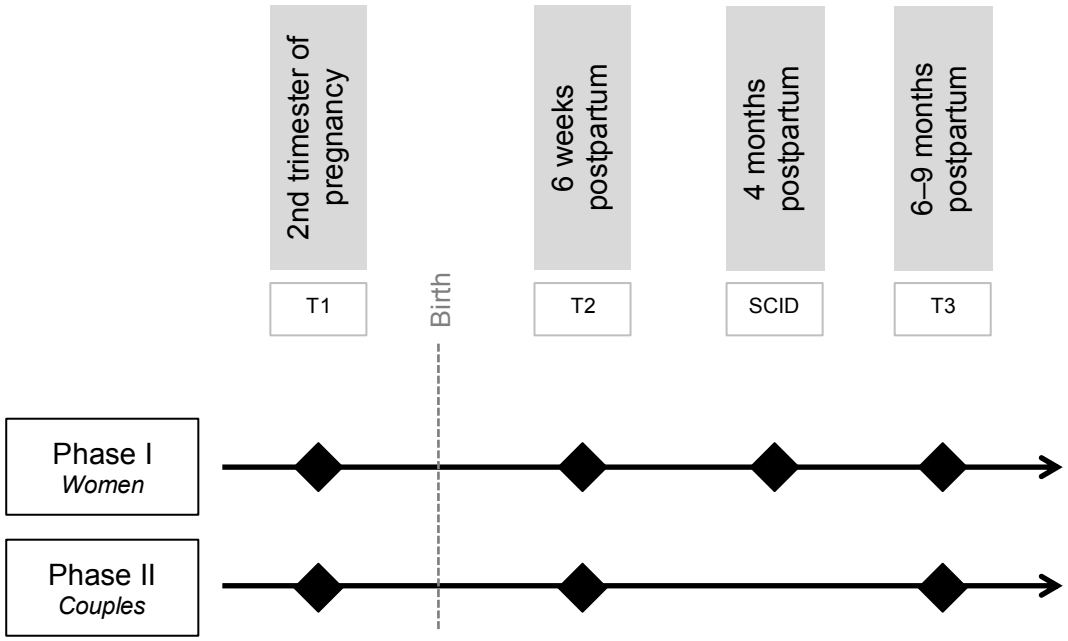

Figure 1 | Longitudinal study design: Assessment times for research phases I and II

Because conducting two distinct longitudinal studies was not considered suitable within the context of a PhD, the same longitudinal design[8] was used to accomplish the objectives of research phases I and II (first and second general objectives), but distinctive features should be noted. First, the research phase I included an additional assessment at four months postpartum[9], which involved the realization of a psychiatric interview (Structured Clinical Interview for DSM-IV Axis I Disorders [SCID-I]) to determine the

[8] Research phases I and II comprised the same sample of women. Women included in research phase II correspond to those women which partners were willing to participate in the study.
[9] In the empirical study II, the SCID-I is designed as Time 3 and the 6-9 months postpartum assessment as Time 4 because it consists of an independent journal submission; to maintain consistency throughout the common parts of this dissertation and avoid confusion, we opted to label the assessment times that were common to both empirical phases in a similar way.

presence (or absence) of a clinical diagnosis of PPD in women.

Second, research phase II has a dyadic design, which means that we used data collected from both women and their partners, taking into account the nonindependence between the members of a couple (Kenny et al., 2006), to address couple-focused research questions. Given the complexity of research with dyads, methodological considerations on dyadic designs (related to sampling, measurement and data collection; Wittenborn et al., 2013) were considered and detailed in this dissertation when appropriate. For instance, some of the study variables were conceptualized as between-dyads variables (i.e., variables that varied between couples but not within a couple; e.g., relationship length), while other variables were defined as mixed variables (i.e., the scores of each member of a couple may differ from one another, and couples, on average, may be different from other couples; e.g., age, education) (Kenny et al., 2006). Dyadic data analysis (Kenny et al., 2006) was privileged in research phase II.

Except for two studies (empirical study I and III), all the empirical studies here described adopted a prospective longitudinal design: empirical study II comprised all the assessment times corresponding to research phase I, empirical study IV comprised the T1 and T2 assessment times and the empirical studies V and VI comprised all the assessment times corresponding to research phase II (T1, T2, and T3). Despite empirical study III included data derived from the longitudinal study, it adopted a cross-sectional design (i.e., only data collected at T1 were analyzed). In empirical study I, we used cross-sectional data collected in the context of the postdoctoral project previously mentioned; briefly, the data were collected at a single time after childbirth (up to 12 months postpartum) from women through an online survey conducted in Portugal.

2.2. Data collection procedures and participants

2.2.1. Procedures: Research phases I and II

As previously stated, a single longitudinal study was carried out to address the objectives corresponding to research phases I and II. Additionally, an online cross-sectional survey was conducted in the context of research phase I. Hence, we will describe parallel and distinct procedures of the empirical research phases.

2.2.1.1. Longitudinal study: common procedures of research phases I and II

Sample recruitment was conducted by the main researcher at the Obstetric Services of the Maternity Daniel de Matos of the Centro Hospitalar e Universitário de Coimbra (MDM-CHUC, EPE), between November 2015 and September 2017, after all the study procedures have been approved by the Research Ethics Committees of the hosting institution (Faculty of Psychology and Education Sciences of the University of Coimbra) and hospital in which the data collection would take place (MDM-CHUC).

The sample was recruited via a consecutive sampling method. In order to maximize women/couples' participation, the director of the Obstetric Services disseminated the research project among obstetricians working at the MDM by email and required their collaboration in the data collection. Therefore, obstetricians presented the study to their patients who met the inclusion criteria and ask their permission to be contacted by the main researcher at the end of the obstetric appointment for additional information about the study. Women/couples who accepted to be further contacted were referred to the main researcher, which presented details about the study (e.g., study objectives; participation at different times, without financial costs for the participants, including the need for additional displacements; confidentiality issues).

General inclusion criteria to participate in the study are summarized in Table 2 as well as the general and specific conditions that participants needed to fulfill to be included in each research phase. It is important to note that both primiparous couples/first-time parents (i.e., couples with any child before the current pregnancy) and multiparous couples/ experienced parents (i.e., couples with at least one child before the current pregnancy) were included in this study. Although past research has mainly focused on the experience of first-time transition to parenthood (due to the novelty element that can be potentially stressful for the couple), as noted, having a subsequent child also yields several changes and reorganizations for all family members. Thus, no recruitment criterion regarding parity was defined.[10] Furthermore, this option facilitated the collection of data from a wide range of couples and maximized subsequent statistical power in the analyses. Additionally, women who reported experiencing complications during their current

[10] Although parity was not specified as a recruitment criterion, this variable was controlled for in the statistical analyses when appropriate to avoid potential confounds.

pregnancy (e.g., infections, gestational diabetes, arterial hypertension, and problems with the placenta) were allowed to continue in the study to the extent that these complications did not interfere with the baby's delivery (e.g., perinatal loss) and health (e.g., congenital anomalies).

Table 2 | Description of the inclusion and exclusion criteria for the longitudinal study

	Research phase I	Research phase II
General inclusion criteria (initial contact)		
Current pregnancy	Second trimester of a singleton pregnancy (12-26 gestational weeks) without medical complications with the baby or other adverse clinical events	
Age	≥ 18 years old	
Marital status	In a current romantic relationship (married, cohabitating or dating)	
Language comprehension	Ability to read and write in Portuguese	
General exclusion criteria (during the study)		
Current pregnancy	Medical complications with the baby or other adverse clinical events (e.g., perinatal loss) Absence of delivery information	
Specific exclusion criteria (during the study)		
Only women completion of the questionnaires	✗	✔
No completion of the SCID-I interview[11]	✔	✗

Participants who agreed to participate and fulfill the general inclusion criteria signed an informed consent (keeping a copy for themselves) and received the assessment protocol[12]. At this time (T1 – second trimester of pregnancy), participants were solicited to return the set of questionnaires in a sealed envelope, available for this purpose, at the next obstetric appointment to the main researcher or to the MDM secretariat. Participants were between 12 and 37 weeks of gestation when they completed the T1 set

[11] Women who did not complete the SCID-I were allowed to complete the last assessment time (T3) but were excluded from the statistical analyses of empirical study II (research phase I).
[12] In the case of a couple's participation, each member received a set of questionnaires and was clearly instructed to be completed separately, without discussing responses with one another.

of questionnaires (gestational weeks, *M* = 23.00, *SD* = 5.30). Participants who completed this first assessment were mailed by post a subsequent set of self-report questionnaires at six weeks postpartum (T2), along with a letter to remember the participation in the study and the general instructions (e.g., the independent completion of the questionnaires by couples) as well as a pre-stamped envelope in order to return them by post to the researcher. On average, couples returned the T2 questionnaires when their children were between 6 and 11 weeks (82.7%; *M* = 9.40, *SD* = 3.12, range: 6-21). Finally, participants were again contacted at the end of the six-month postpartum (T3); we labeled this assessment time as "between six and nine months postpartum" because we considered to be valid the assessment protocols which were returned to the researcher during this interval of time, in order to retain a maximum of participants. On average, couples returned the T3 questionnaires when their children were between 6 and 7 months old (78.3%; *M* = 6.83, *SD* = 0.85, range = 5.5 – 9.0). For each follow-up assessment (T2 and T3), only participants who completed the set of questionnaires corresponding to the previous assessment time were contacted. It should be noted that in the research phase I this procedure was applied regardless of women's completion of the diagnostic interview (i.e., women who completed the T2 assessment but not the interview were also contacted at T3).

The participants were assigned a unique code to allow the respective follow-up over time and were asked for permission to receive reminder text-messages about the completion and delivery of the set of questionnaires in order to minimize drop-outs. All participants agreed to be contacted and provided their contact information. At T1, reminders were sent 1-2 days before the obstetric appointment and at T2 and T3, reminders were sent within 2 to 3 weeks after the questionnaires being mailed in the case of non-response in this period. In both research phases, individuals participated voluntarily and were not compensated for their participation.

The selection of the assessment times was based on theoretical and practical reasons. First, to reduce participants' response burden, we opted to only assess couples once during pregnancy. We selected the second trimester of pregnancy as the baseline assessment time (T1) because it represents a relatively stable trimester in terms of emotional reactions for both women and their partners (Cameron et al., 2016; Figueiredo & Conde, 2011; Teixeira, Figueiredo, Conde, Pacheco, & Costa, 2009) and it is at this time that men have their first contact with the reality of the fetus (Canavarro, 2001; Kowlessar

et al., 2015b). Additionally, the rates of perinatal complications (including gestational loss) during the first trimester of pregnancy are higher compared to the second and third trimester, and then recruiting women during the first trimester would probably result in loss of participants at the postpartum assessment (even if in a small proportion). Second, because the participants were asked to complete the questionnaires at home and to return them at the next appointment, the likelihood to receive the questionnaires still during the course of the pregnancy would be higher if couples were recruited during the second vs. third trimester, because for most women the last obstetric appointment occur in the third trimester of pregnancy.

The assessment at six weeks postpartum (T2) is widely used in the perinatal literature: it represents a period of acute stress for both women and their partners as the changes and reorganizations in the family life are still new. This allows us to understand women/couples' experiences in the early postpartum period, when facing the initial changes after having a baby. Moreover, because the follow-up routine obstetric appointment after childbirth occurred generally at six weeks postpartum, the data obtained at this time may have important implications for clinical practice. Finally, the period between six and nine months postpartum (T3) allows us to understand women/couples' adjustment to daily life after the period of parental leave, which is expected to be a relatively normative/stable period.

2.2.1.2. Distinctive procedures of research phase I

Two unique procedures of research phase I should be acknowledged. First, prior to any data collection and after permission from the original author, the PDPI-R was translated into the European Portuguese language through the forward-backward translation technique. This method allows maintaining semantic equivalence with the original version by including several steps. Specifically, in this study, (1) three independent researchers translated the items from the original English version to the European Portuguese language; (2) the researchers met and discussed the three draft versions and together elaborated a common version; (3) the common version was backward translated by a fourth translator; and (4) the researchers reviewed the forward and backward translations and elaborated an experimental Portuguese version of the PDPI-R. This procedure was easily conducted without major translation's difficulties because the

instructions and items of the original version of the PDPI-R are clear, brief and simple as well all culturally relevant to the Portuguese context.

The experimental version of the PDPI-R was first tested in an online cross-sectional survey (pilot study – empirical study I). Subsequent to obtaining approval from the Research Ethics Committees of the Faculty of Psychology and Education Sciences of the University of Coimbra and CHUC, the study was disseminated through advertisements in the MDM (e.g., recruitment flyers) and social media (e.g., *Facebook*), between December 2015 and March 2016. Eligibility criteria included: (a) have given birth during the last 12 months; (b) being 18 years or older; and (c) being able to read and understand Portuguese. Women interested in participating acceded the website link to the online survey (hosted by LimeSurvey®), available in all the local and online advertisements. The webpage started with a description of the study and ethical considerations (e.g., the participation was voluntary without monetary or other compensations, participants could withdraw the study at any time, anonymity and confidentiality were guaranteed), and women who agreed to participate were required to answer affirmative to the question "Do you agree to participate in this study?". Women were then directed to the completion of the survey, which access was secure and prohibited the same user to complete the survey more than once. A convenience sample of 480 women completed the survey. Because the purpose of the postnatal version of the PDPI-R is to identify women at-risk in the early postpartum period, only women being in the first or second months postpartum were included in this study (n = 204).

Second, as previously stated, in the longitudinal study (field study – empirical study II), beyond the three assessment times in which women completed self-report questionnaires, those women who returned the T2 assessment protocol were called by phone by the researcher at four months postpartum. The objective of this phone call, previously allowed, was to conduct a structured psychiatric interview to establish a clinical diagnosis of PPD during the third/four months postpartum. This time frame was selected due to the consensual high prevalence of PPD found at this time (Gaynes et al., 2005). To ensure methodological coherence, the same interviewer conducted all interviews, which lasted on average approximately 10 minutes (range: 5 – 50 minutes). The researcher made a maximum of three attempts to interview the women in order to avoid potential intrusion at this sensitive time; after the three phone call attempts women were sent a text message informing about the purpose of the phone call and asking for an ideal time

to be further contacted if they maintain interest in participating in the study. Women answered the SCID-I interview in a time that was ideal for both parts.

2.2.2. Sample selection and attrition of the longitudinal study

Because the research phases I and II encompassed different objectives, the selection of the sample to be considered in each phase entailed distinctive steps, which are summarized in Figure 2 (sample selection for research phase I) and Figure 3 (sample selection for research phase II). In general, the rate of participants that discontinued the participation from T1 to T3 was of 70%. We highlighted that this attrition rate includes women/couples that showed, after T1 assessment completion, that they no longer met the criteria for participating and consequently they were not contacted at subsequent times.

Specifically regarding research phase I, the selection of participants described in Figure 2 corresponds precisely to the selection procedure used in empirical study II. Because we were particularly interested in the validation of the PDPI-R against a robust gold standard, only women who completed the SCID-I interview were included in the study (n = 140), regardless of the T3 assessment completion.

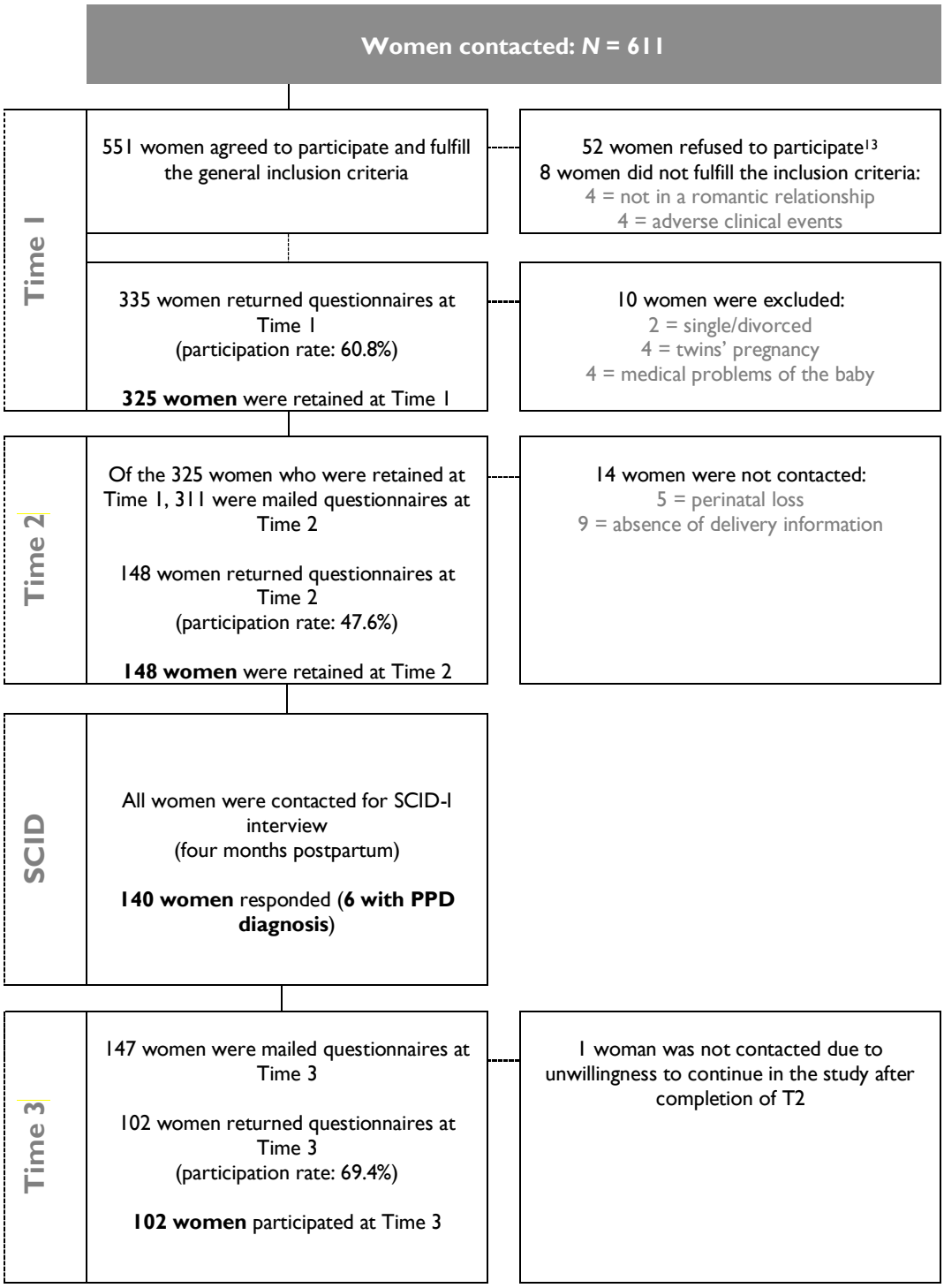

Figure 2 | Longitudinal study: Sample selection and attrition for the research phase I

[13] The reasons for participants' refusal were not systematically assessed but included mostly lack of time or interest in the study and being experienced parents.

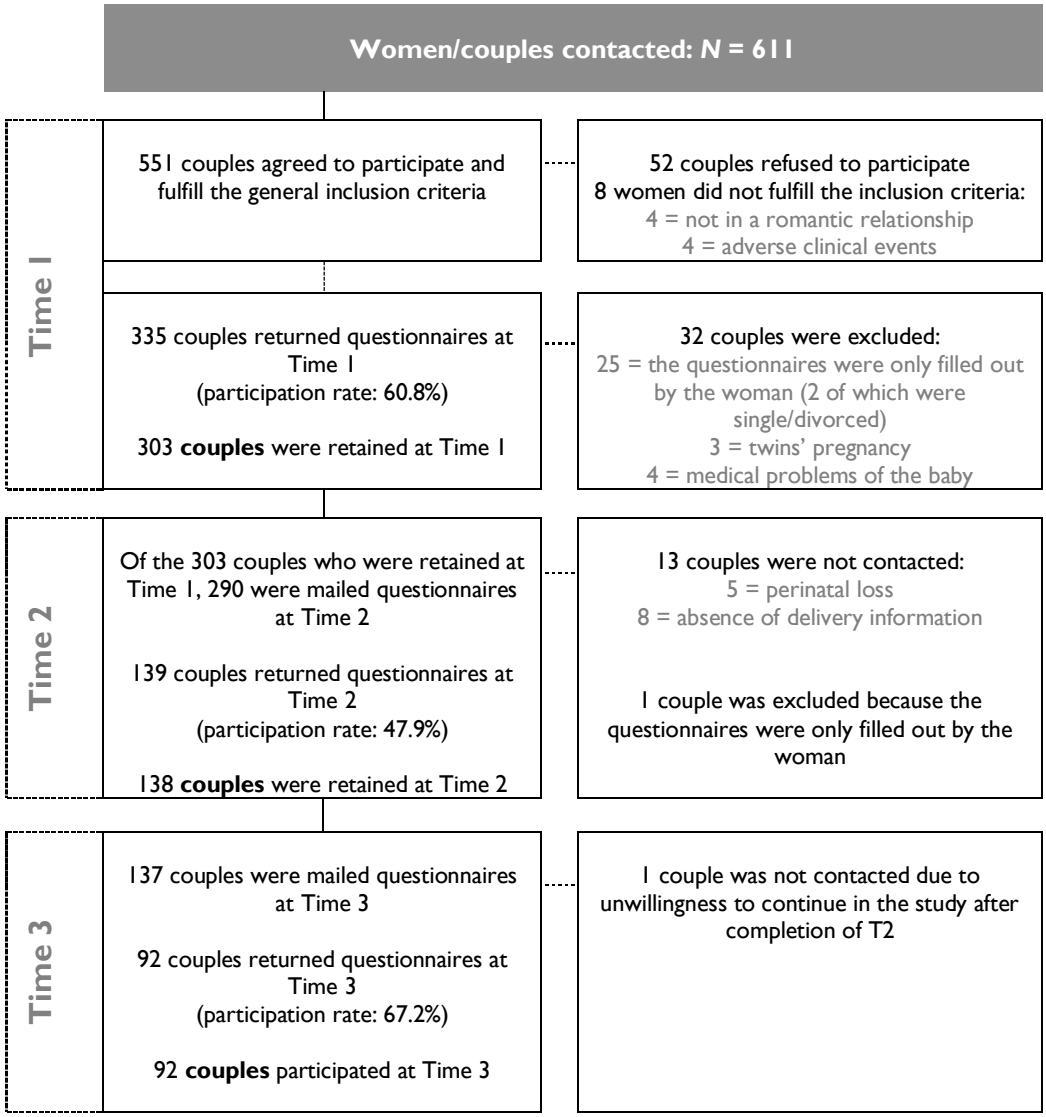

Figure 3 | Longitudinal study: Sample selection and attrition for the research phase II

Concerning research phase II, it is important to note that the selection of participants described in Figure 3 corresponds to the total sample; the sample size varied between the empirical studies as a function of the objectives, design and statistical analyses of the study (see Chapter III).

2.2.3. Participants

The sociodemographic, clinical and obstetric characteristics of the participants involved in this research project are summarized in Table 3 (research phase I) and Table

4 (research phase II). In the longitudinal study, these characteristics were only assessed once, at T1 (except for the sex of the baby that was assessed at T2)[14].

2.2.3.1. Participants: Research phase I

The overall sample of women involved in research phase I corresponds to a typical community sample recruited during the perinatal period: women had a mean age of 32 years, were generally well educated and currently employed, were married or cohabitating (*de facto* union) and were expecting a planned first child under relatively healthy conditions.

Specifically regarding the longitudinal study (field study), the women that completed the research project (n = 102) differed significantly from those who dropped out from the study at T2 or T3 (n = 209) on the following variables: (1) planned pregnancy (completers were more likely to have a planned pregnancy than non-completers; 86.3% vs. 74.5%, $\chi^2(1) = 5.56$, $p = .018$, $\varphi_c = 0.14$) and (2) pregnancy complications (completers were less likely to have pregnancy complications than non-completers; 21.6% vs. 38.6%, $\chi^2(1) = 9.01$, $p = .003$, $\varphi_c = 0.17$). No differences were found in the remaining variables.

[14] However, as the number of participants varies in the different assessment moments, we provide a description of the characteristics of the participants who responded at each assessment time.

Table 3 | Participants' characteristics of the research phase I

	Pilot study	Field study			
	1-2 months postpartum (*n* = 204)	T1 (*n* = 325)	T2 (*n* = 148)	SCID (*n* = 140)	T3 (*n* = 102)
Sociodemographic and clinical data					
Age (years), *M* (*SD*)	32.75 (4.64)	31.80 (4.78)	32.25 (4.91)	32.26 (4.97)	32.31 (5.05)
Min–Max	19 – 43	19 – 48	20 – 48	20 – 48	20 – 48
Educational level, *n* (%)					
Middle school	10 (4.9)	21 (6.5)	6 (4.1)	6 (4.3)	6 (5.9)
High school	51 (25.0)	103 (31.7)	40 (27.0)	35 (25.0)	27 (26.5)
University	143 (70.1)	197 (60.6)	101 (68.2)	98 (70.0)	68 (66.7)
Professional status, *n* (%)					
Employed	165 (80.9)	271 (83.4)	128 (86.5)	121 (86.4)	86 (84.3)
Unemployed/Other[a]	39 (19.1)	51 (15.7)	17 (11.5)	16 (11.4)	15 (14.7)
Area of residence, *n* (%)					
Urban	123 (60.3)	153 (47.1)	69 (46.6)	67 (47.9)	51 (50.0)
Rural	81 (39.7)	166 (51.1)	78 (52.7)	72 (51.4)	50 (49.0)
Relationship status, *n* (%)					
Single/Divorced	22 (10.8)	-	-	-	-
Married/ Cohabitating	177 (86.8)	310 (95.4)	141 (95.3)	133 (95.0)	98 (96.1)
Dating	5 (2.5)	15 (4.6)	7 (4.7)	7 (5.0)	4 (3.9)
Prior children (yes), *n (%)*	69 (33.8)	125 (38.5)	55 (37.2)	52 (37.1)	37 (36.3)
Psychological history (yes), *n(%)*					
Psychological problems	72 (35.3)[b]	111 (34.1)	54 (36.5)	50 (35.7)	40 (39.2)
Psychological treatment	[c]	87 (26.7)	37 (25.0)	35 (25.0)	27 (26.5)
Obstetric data					
Obstetric history (yes), *n (%)*					
Pregnancy loss history	43 (21.1)	65 (20.0)	37 (25.0)	34 (24.3)	24 (23.5)
Infertility history	19 (9.3)	34 (10.5)	14 (9.5)	13 (9.3)	9 (8.8)
Current pregnancy (yes), *n* (%)					
Planned pregnancy	164 (80.4)	249 (76.6)	124 (83.8)	116 (82.9)	88 (86.3)
Desired pregnancy	203 (99.5)	314 (96.6)	146 (98.6)	138 (98.6)	100 (98.0)
Pregnancy complications	67 (32.8)	109 (33.5)	40 (27.0)	39 (27.9)	22 (21.6)
Sex of the baby (female)	110 (53.9)	[d]	72 (48.6)	70 (50.0)	52 (51.0)

Note. In some variables, the Ns of women do not add up to the total sample size (100%) due to missing values.

[a] Other situations included students, research fellows and independent workers (pilot study = 5; field study = 2).

[b] In the pilot study, previous psychological problems were only assessed regarding depression (PDPI-R item).

[c] In the pilot study, previous psychological treatment was not assessed.

[d] At T1, 118 women did not know yet the sex of the baby.

2.2.3.2 Participants: Research phase II

When comparing women and men in the sociodemographic and clinical variables, overall, women were younger, were more likely to have university education and history of psychopathology, and were less likely to be employed at T1, compared to men. These comparison analyses (women vs. men) are fully described in the appropriate section of the empirical studies IV, V and VI (see Chapter III).

The couples that completed all the assessment times (n = 92) differed significantly from those who dropped out from the study at T2 or T3 (n = 198) on (1) parity (men who completed the study were less likely to have children before this pregnancy), (2) pregnancy complications (women who completed the study were less likely to have pregnancy complications), and (3) planned pregnancy (women who completed the study were more likely to have a planned pregnancy). These comparison analyses (completers vs. non-completers) are fully described in the appropriate section of the empirical studies V and VI (see Chapter III).

Table 4 | Participants' characteristics of the research phase II

	Assessment times					
	T1 (*n* = 303)		T2 (*n* = 138)		T3 (*n* = 92)	
	Women	**Men**	**Women**	**Men**	**Women**	**Men**
Individual data						
Age (years), *M*	31.61	33.74	31.96	33.44	31.78	33.51
(*SD*)	(4.66)	(5.15)	(4.75)	(5.36)	(4.77)	(5.18)
Min–Max	19 – 43	19 – 52	20 – 41	19 – 50	20 – 41	20 – 45
Educational level, *n* (%)						
Middle school	17 (5.6)	78 (25.7)	5 (3.6)	25 (18.1)	5 (5.4)	19 (20.7)
High school	98 (32.3)	96 (31.7)	39 (28.3)	50 (36.2)	26 (28.3)	33 (35.9)
University	184 (60.7)	125 (41.3)	93 (67.4)	60 (43.5)	60 (65.2)	38 (41.3)
Professional status, *n* (%)						
Employed	252 (83.2)	277 (91.4)	119 (86.2)	124 (89.9)	77 (83.7)	81 (88.0)
Unemployed/Other[a]	48 (15.8)	21 (6.9)	16 (11.6)	12 (8.7)	14 (15.2)	9 (9.8)
Area of residence, *n* (%)						
Urban	141 (46.5)	151 (49.8)	62 (44.9)	67 (48.6)	44 (47.8)	49 (53.3)
Rural	158 (52.1)	148 (48.8)	75 (54.3)	70 (50.7)	47 (51.1)	42 (45.7)
Psychological history (yes), *n* (%)						
Psychological problems	103 (34.0)	16 (5.3)	49 (35.5)	8 (5.8)	35 (38.0)	4 (4.3)
Psychological treatment	81 (26.7)	28 (9.2)	35 (25.4)	15 (10.9)	25 (27.2)	11 (12.0)
Couple data						
Relationship status, *n* (%)						
Married	187 (61.7)		89 (64.5)		65 (70.7)	
Cohabitating	104 (34.3)		43 (31.2)		24 (26.1)	
Dating	12 (4.00)		6 (4.3)		3 (3.3)	
Relationship length (years)**,** *M* (*SD*)	7.16 (4.49)		7.51 (4.48)		7.40 (4.23)	
Min–Max	5 months – 22 years		7 months – 22 years		11 months – 17 years	
Prior children (yes), *n (%)*	119 (39.3)		49 (35.5)		29 (31.5)	
Obstetric data						
Obstetric history (yes), *n (%)*						
Pregnancy loss history	56 (18.5)		32 (23.2)		19 (20.7)	
Infertility history	32 (10.6)		13 (9.4)		8 (8.7)	
Current pregnancy (yes), *n* (%)						
Planned pregnancy	235 (77.6)		117 (84.8)		81 (88.0)	
Desired pregnancy	294 (97.0)		136 (98.6)		90 (97.8)	
Pregnancy complications	104 (34.3)		39 (28.3)		21 (22.8)	
Sex of the baby (female)	[b]		65 (47.1)		45 (48.9)	

Note. In some variables, the Ns of women do not add up to the total sample size (100%) due to missing values.

[a] Other situations included students (=3) and retired persons (=1).

[b] At T1, 110 women did not know yet the sex of the baby.

2.3. Variables and measures

This research project grounds on a quantitative research method approach and data were collected by using a set of self-administered questionnaires (the application of the SCID-I by phone constituted the unique exception). Sociodemographic and clinical datasheets were developed by the research team specifically for this research project. The selection of the self-report questionnaires used to operationalize the constructs under study was based on the following generic methodological requirements: (1) instruments that allow the operationalization of multi-dimensional constructs, considering the assessment of positive and negative domains; (2) instruments short in length, therefore allowing the assessment of multiple variables/ dimensions in a quick and cost-effective way, while reducing the participants' response burden; (3) instruments already validated in the European Portuguese language; and (4) instruments with robust psychometric qualities (of reliability and validity), confirmed in the Portuguese validation studies. In addition, we favored instruments validated among both women and men – therefore allowing direct comparisons within couples – and that allowed the assessment of both individual and dyadic perspectives (Wittenborn et al., 2013). The data collection method for the longitudinal study (measures, variables, respondents and times) is described in Table 5.

Table 5 | Longitudinal study: Measures and variables for each partner and assessment time

Measures	Variables	Partner		Assessment times			
		♀	♂	T1	T2	SCID	T3
Sociodemographic and clinical information		✔	✔	✔			
Obstetric information (past and current)		✔		✔	✔		
Screening							
Postpartum Depression Predictors Inventory – Revised (PDPI-R)	Risk factors for PPD	✔		✔	✔		
Individual adjustment							
Edinburgh Postnatal Depression Scale (EPDS)	Depressive symptoms	✔	✔	✔	✔		✔
Hospital Anxiety and Depression Scale – Anxiety subscale (HADS-A)	Anxiety symptoms	✔	✔	✔	✔		✔
EUROHIS-QOL-8	Quality of life	✔	✔	✔	✔		✔
SCID-I	Clinical diagnosis of PPD	✔				✔	
Marital adjustment							
Revised Dyadic Adjustment Scale (RDAS)	Dyadic adjustment. Dimensions: Consensus, satisfaction, and cohesion.	✔	✔	✔	✔		✔
Parental adjustment							
Parenting Stress Index-Short Form (PSI-SF)	Parenting stress. Dimensions: Parental distress, parent-child dysfunctional interaction, difficult child	✔	✔		✔		✔
Parental Confidence Questionnaire (PCQ)	Parental confidence. Dimensions (Portuguese version): Knowledge of the infant, caretaking tasks, and evaluation of the parenting experience	✔	✔		✔		✔

		♀	♂	T1	T2	SCID	T3
Interpersonal variables							
Experience in Close Relationships - Relationship Structures (ECR-RS)	Adult attachment representations (partner domain). Dimensions: Anxiety and avoidance	✔	✔	✔			
Dyadic Coping Inventory (DCI)	Dyadic coping forms: Stress communication by self and by partner, supportive DC by self and by Partner, negative DC by self and by partner, delegated DC by self and by partner, and common DC.	✔	✔	✔	✔		

Of the selected set of self-report questionnaires, only the PDPI-R was not adapted for the Portuguese population at the beginning of our study; its translation and adaptation was the main objective of research phase I. For the remaining self-report questionnaires, the already existing Portuguese validation studies confirmed their adequate psychometric properties. The reliability values (Cronbach's alpha) found in our study samples are described in the method's section of the respective studies (see Chapter III). Table 6 summarizes the instruments used in each empirical study of both research phases. A full description of the measures included in this research project is now presented.

Table 6 | Measures used in each empirical study

Measures	Empirical studies					
	Research phase I		Research phase II			
	I	II	III	IV	V	VI
Sociodemographic and clinical information	✓	✓	✓	✓	✓	✓
Obstetric information	✓	✓	✓	✓	✓	✓
Screening						
PDPI-R	✓	✓				
Individual adjustment						
EPDS	✓	✓	✓	✓		✓
HADS-A				✓		✓
EUROHIS-QOL-8				✓		
SCID-I		✓				
Marital adjustment						
RDAS			✓			✓
Parental adjustment						
PSI-SF					✓	✓
PCQ					✓	
Interpersonal variables						
ECR-RS					✓	
DCI			✓	✓	✓	✓
Cognitive variables						
PNTQ[a]	✓					

[a] The Postnatal Negative Thoughts Questionnaire was only included in empirical study I to assess, along with other measures, the convergent validity of the PDPI-R.

2.3.1. Socio-demographic, clinical and obstetric information

The sociodemographic and clinical datasheet developed for the longitudinal study inquired participants (at baseline – T1) about their own sex, age, marital status (married, cohabitating or in a relationship without living together), length of the marital relationship, educational level, professional status (employed, unemployed, student or retired), area of residence (rural or urban), number of children, history of psychiatric/psychological problems and history of psychiatric/psychological treatment (yes/no questions). In addition, women provided information on their own obstetric history (i.e., history of

pregnancy loss and infertility; yes/no question) as well as on their current pregnancy, including pregnancy intention (planned and desired pregnancy; yes/no question), gestational weeks when completing the T1 assessment, sex of the baby (female, male or "I don't know yet"), occurrence of medical complications during the current pregnancy (e.g., infections, gestational diabetes, arterial hypertension, and problems with the placenta; yes/no question), presence of a twins' pregnancy (yes/no question), and presence of a medical problem of the baby (yes/no question). At six weeks postpartum (T2), women provided data about the type delivery (vaginal or caesarean), occurrence of birth complications (yes/no question) and baby's characteristics (sex, gestational age at birth and infant's weight at birth). In case of incomplete/missing obstetric information provided by the women, the researcher was allowed to consult women's medical records at the MDM.

It is important to highlight that, in the dyadic analyses, although most variables were treated as mixed variables (variables that differ within and between couples), some of them were conceptualized as between-dyad variables as the scores for both women and men were the same in a given couple (i.e., marital status and length of the marital relationship). In addition, the score of women and men regarding number of children was combined to create a between-dyad score (i.e., primiparous vs. multiparous couples)[15]. In the online cross-sectional survey (empirical study I), similar sociodemographic (age, educational level, professional status, marital status, area of residence, presence of other/prior children) and obstetric (history of pregnancy loss and infertility, sex of the baby, age of the baby when completing the survey, presence of obstetric complications during the course of the pregnancy, presence of a medical problem of the baby) data were collected among women.

2.3.2. Screening of risk factors for PPD

For identifying women with risk factors for developing PPD, we used the Postpartum Depression Predictors Inventory – Revised (PDPI-R; Beck, 2002; Beck et al., 2006), which is a screening measure suitable for assessing risk factors for PPD during the

[15] In the cases when only one member of the couple reported having a prior child and the other member did not provide this information or reported not having prior children, we considered the couple as multiparous.

prenatal period (with its prenatal version) and postpartum period (with its postnatal version). The prenatal version includes 10 risk factors, assessed through 32 items: marital status [single, married/cohabitating, separated, divorced, widowed and partnered] (1 item), socioeconomic status [low, middle, high] (1 item), low self-esteem (3 items), prenatal depression (1 item), prenatal anxiety (1 item), pregnancy intention [unwanted/unplanned] (2 items), history of previous depression (1 item), lack of social support [from partner, family and friends] (4 similar items for each of the relationship; total of 12 items), marital dissatisfaction (3 items), and life stress (7 items). For marital and socioeconomic status, women need to select one of the available options (the options single, separated, divorced, or widowed and low socioeconomic status are indicators of the presence of risk, receiving a score of "1"). The remaining factors are assessed through yes/no questions, and women's responses are coded with "0" (suggesting absence of risk) or "1" (suggesting presence of risk). The postnatal version includes three additional risk factors to the prenatal version, also assessed through yes/no questions: childcare stress (3 items), difficult infant temperament (3 items), and maternity blues (1 item). In total, the postnatal version includes 13 risk factors, assessed through 39 items. A separate total score for each risk factor and version of the PDPI-R (ranging from 0 to 32 for the prenatal version and from 0 to 39 for the postnatal version) can be computed by summing up the respective items, with higher values indicating greater risk for PPD. The full scoring procedure is detailed in Beck et al. (2006).

The original structure of the PDPI-R was maintained during the translation and adaptation process to the European Portuguese language (literal translation of the items), with only slight modifications to improve clarification of the meaning of each item: 1) the term "Partnered" in the original version, which means "having a partner", was substituted for "In a relationship (without living together)" to increase distinction of "Married/ cohabitating" status; 2) the question "Was the pregnancy unwanted?" was reformulated as "Is the pregnancy wanted?" (response: wanted vs. unwanted) to account for two aspects: the current feeling of desire (present tense is more appropriate during the prenatal administration; Is vs. Was) and the same direction of the question that preceded it (i.e., "Was the pregnancy planned?"); 3) the expression "Do you feel you" in the original item that assess social support (e.g., "Do you feel you can confide on your partner?"; Beck, 2002) was maintained instead of the expression "Do you believe you" stated in Beck et al. (2006) to be more relatable; and 4) the original example given for instrumental support

(i.e., "babysitting") was substituted for "help with child care" because "babysitting" is commonly translated as "taking care of the child when the mother/father is absent". Instead, the purpose here is to assess the general help with usual caretaking tasks. Additionally, we do not have in the European Portuguese language a single term that accounts for babysitting.

2.3.3. Individual adjustment outcomes

2.3.3.1. Depressive symptoms

The Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987; Portuguese version [PV]: Areias, Kumar, Barros, & Figueiredo, 1996), a widely used self-report questionnaire specifically designed to perinatal research and clinical practice, was selected in our study to assess depressive symptoms during pregnancy and the postpartum period. It comprises 10 Likert-scaled items (range 0 – 3) that cover different emotions (e.g., sadness, tearfulness, anxiety) that participants are asked to rate considering the previous seven days. The sum of the 10 items yields an overall score of depressive symptoms (range 0 – 30), with higher values indicating more symptoms. Existing cut-off scores (e.g., 10 in the Portuguese validation studies) allows the identification of women with a possible depressive disorder. The EPDS was originally developed to screen postpartum depression among women, however subsequent work has demonstrated the scale to be valid in the antenatal period (Kozinszky & Dudas, 2015), as well as to be valid for men (Matthey, Barnett, Kavanagh, & Howie, 2001). These features justify its inclusion in our study.

2.3.3.2. Anxiety symptoms

For assessing anxiety symptoms, we selected the Anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A; Zigmond & Snaith, 1983; PV: Pais-Ribeiro et al., 2007), which is a brief self-report instrument that assesses depressive and anxiety symptoms along two distinct subscales: the Depression subscale and the Anxiety subscale (the former was not used in our research project). Each subscale includes 7 items (example of the Anxiety subscale: "I get a sort of frightened feeling, like something awful is about to happen") to be answered in a 4-point (0 – 3) response scale considering the

previous week as reference. This instrument provides a total sum score for each subscale (range 0 – 21), with higher values indicating more symptoms. Although originally developed to be applied in general hospital settings, this instrument has been used in multiple clinical and community settings, including with perinatal populations (Meades & Ayers, 2011). Its shortness is one of its more valuable features and justifies its inclusion in our study.

2.3.3.3. Quality of life

The participants' QoL was assessed with the EUROHIS-QOL 8-index (Power, 2003; PV: Pereira, Melo, Gameiro, & Canavarro, 2011), a brief self-report instrument derived from the WHOQOL-100 and WHOQOL-BREF questionnaires (WHOQOL Group, 1998ab). These questionnaires were designed to assess QoL as operationalized by the WHOQOL Group (1994), that is, the individual's perception of well being in the physical, psychological, social, and environmental life domains. In the EUROHIS-QOL 8-index, these four domains are represented by two items each: Physical domain (e.g., "Do you have enough energy for everyday life?"), Psychological domain (e.g., "How satisfied are you with yourself?"), Social domain (e.g., "How satisfied are you with your personal relationships?"), and Environment domain (e.g., "How satisfied are you with the conditions of your living place?"). Participants are asked to answer the items in a 5-point response scales (e.g., from *not at all* to *completely*, from *very dissatisfied* to *very satisfied*) considering the previous two weeks. The eight items can be summed into a global score, which is next transformed to be comparable with other validated instruments (0 – 100). Higher values indicate a better perception of QoL. The choice to include a measure of QoL in our study was due to the paucity of studies considering positive indicators of individual adjustment during the perinatal period, which are essential to obtain a comprehensive understanding of partner's adjustment at the individual level. We selected this brief screening measure because of its short form, which allows assessing multiple dimensions of the participants' life in a favorable time-consuming way.

2.3.3.4. Diagnosis of PPD

The clinical diagnosis of PPD was established through the Structured Clinical Interview for DSM-IV Axis I Disorders, Clinician Version (SCID-CV; First, Spitzer, Gibbon,

& Williams, 1996; translation to Portuguese: Maia, 2006). The SCID is a semi-structured interview carried out to determine the presence of psychiatric disorders according to the criteria of the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV; American Psychiatric Association, 1994). It is divided into separate modules corresponding to distinct categories of diagnoses. For the purpose of this research project (research phase I), women were only inquired about the criteria pertaining to the diagnosis of minor or major depressive episodes (mMD), which included two first generic questions about (A1) depressed mood and (A2) loss of interest and pleasure. These questions were made with reference to the previous month (i.e., during the fourth month postpartum, women were asked to think about the worst two weeks within the third month postpartum). Women who responded affirmatively to at least one of these questions were asked subsequent questions, addressing the remaining criteria of mMD (significant weight loss or gain or decrease or increase in appetite; insomnia or hypersomnia; psychomotor agitation or retardation; fatigue or loss of energy; feelings of worthlessness or excessive or inappropriate guilt; diminished ability to think or concentrate, or indecisiveness; recurrent thoughts of death, suicidal ideation, specific plan for committing suicide or suicide attempt), and time of onset was recorded. In addition, women were inquired about significant changes from previous functioning in multiple domains of life, presence of a medical condition or substance use, and death of a significant person.

Respondents are considered to have a mMD when they experienced two to four (minor episode) or at least five (major episode) of the symptoms above described (including A1 or/and A2) during the same two-week period and the symptoms, not better explained by other situations, have leaded to significant impairments in important areas of functioning (e.g., social, professional). In our study, a woman who had a mMD that started after childbirth and was still present within the third month postpartum was considered to have PPD[16]. Two main reasons justify the selection of the SCID for our study. First, its wide applicability as a gold standard to determine the validity of screening measures for depression, including during the perinatal period (e.g., EPDS; Gibson, McKenzie-McHarg,

[16] The six women identified with a clinical diagnosis of PPD during the third month postpartum met the criteria for a major depressive episode (MD).

Shakespeare, Price, & Gray, 2009; Kozinszky & Dudas, 2015). Second, its availability in the European Portuguese language[17].

2.3.4. Dyadic adjustment outcomes

2.3.4.1. Dyadic adjustment

For assessing dyadic adjustment, we selected the Revised Dyadic Adjustment Scale (RDAS; Busby, Christensen, Crane, & Larson, 1995; PV: Pereira, Moura-Ramos, Narciso, & Canavarro, 2017, July). The RDAS comprises 14 items that cover three broad marital dimensions: relationship satisfaction (4 items addressing stability and conflict; e.g., "How often do you discuss terminating your relationship?"), cohesion (4 items addressing activities and discussion in the relationship; e.g., "How often do you have a stimulating exchange of ideas?") and consensus (6 items addressing decision making, values, and affection; e.g., level of agreement regarding career decisions). The items are to be answered in a 6-point response scale (e.g., 0 = *always disagree* to 5 = *always agree*) or a 5-point response scale (e.g., 0 = *never* to 4 = *every day*). Separate mean scores can be calculated for each dimension and a total score of dyadic adjustment can be obtained from the sum of the scores on the 14 items (range 0 – 69). Higher scores indicate more dyadic adjustment.

2.3.5. Parental adjustment outcomes

2.3.5.1. Parenting stress

The Parenting Stress Index – Short Form (PSI-SF; Abidin, 1995; PV: Santos, 2011, July) was used to assess the levels of stress in the parent-child system. Derived from the original version of the questionnaire (120 items), this shorter version includes 36 items clustered into three parenting stress-related domains: Parental distress (12 items assessing

[17] Due to the absence of a diagnostic interview using the DSM-5 criteria (American Psychiatric Association, 2013) available in the Portuguese language, we used the existing Portuguese version of the SCID for DSM-IV Disorders, which is still considered appropriate due to the minor changes from DSM-IV to DSM-5 regarding the diagnosis of mMD. The core criteria symptoms, including the requisite length of a two-week period and associated clinically significant impairment from previous functioning in DSM-IV are identical to that of DSM-5. The bereavement exclusion criterion (i.e., depressive symptoms lasting less than 2 months following the death of a loved one) represents the main difference between the two versions, as it was excluded from DSM-5 (American Psychiatric Association, 2013). However, in our study, no presence of a mMD was excluded based on this criterion.

the level of stress resulting from the demands of child-rearing, for example, stress associated with the restrictions placed on other roles or conflicts with the partner: "My child has caused more problems than I expected in my relationship"), Difficult child (12 items assessing parental perceptions about the child's self-regulating abilities; e.g., "My child gets upset easily over the smallest thing"), and Parent-child dysfunctional interaction (12 items assessing parents' dissatisfaction regarding the interactions with their child as well as the perceptions about how the child meet parental expectations; e.g., "Sometimes I feel my child does not like me and does not want to be close to me"). Individuals are asked to classify their level of agreement regarding each of the 36 items, in a 5-point Likert-scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). A score for each dimension (range 12 – 60) and a global score comprising the 36 items (range 36 – 180) can be computed from the sum of the respective items, with higher scores indicating higher levels of stress.

2.3.5.2. Parental confidence

Parental confidence was assessed with the Maternal Confidence Questionnaire (MCQ; Badr, 2005), designed by the authors of the Portuguese version as *Parental Confidence Questionnaire* (PCQ; Nazaré, Fonseca, & Canavarro, 2011) to be inclusive of both mothers and fathers. The Portuguese version comprises 13 items grouped into three subscales: Knowledge of the Infant (6 items; perceived knowledge of the infant's needs and motivations; e.g., "I know what makes my baby happy"), Caretaking Tasks (3 items; perceived competence in the caretaking tasks; e.g., "I can hold my baby properly"), and Evaluation of the Parenting Experience (4 items; perceived confidence and satisfaction associated with the parental role; e.g., "I have all the skills needed to be a good parent"). The 13 items are scored on a 5-point response scale ranging from 1 (*never*) to 5 (*always*), allowing the computation of a mean score for each subscale as well as a global score of parental confidence based on the 13 items (range 1 – 5). Higher scores indicate higher perception of parental confidence. Although originally developed to assess women's maternal confidence, its suitability among men has been confirmed by the Portuguese validation studies (Nazaré et al., 2011). This distinctive feature in relation to other women-centered instruments, and the fact that it contributes to a comprehensive understanding of the parental adjustment (by addressing a positive domain of the parental functioning

rather than the usual negative approach) constitute key reasons to include the PCQ in our study.

2.3.6. Interpersonal variables

2.3.6.1. Dyadic coping

The couples' DC strategies were assessed with the Dyadic Coping Inventory (DCI; Bodenmann, 2008; PV: Vedes, Nussbeck, Bodenmann, Lind, & Ferreira, 2013), a widely used instrument that was developed based on the STM. This self-report questionnaire assesses core components of the DC process, such as different forms of stress communication (emotion and problem-focused) and DC strategies (supportive, delegated, negative and common). The DCI is composed of 37 items, assigned to nine subscales: Stress communication by self (4 items; e.g., "I tell my partner openly how I feel and that I would appreciate his/her support") and by partner (4 items; e.g., "My partner lets me know that he/she appreciates my practical support, advice, or help"), Supportive DC by self (5 items; e.g., "I show empathy and understanding to my partner") and by partner (5 items; e.g., "My partner listens to me and gives me the opportunity to communicate what really bothers me"), Delegated DC by self (2 items; e.g., "I take on things that my partner would normally do in order to help him/her out") and by partner (2 items; e.g., "When I am too busy, my partner helps me out"), Negative DC by self (4 items; e.g., "I do not take my partner's stress seriously") and by partner (4 items; e.g., "When I am stressed, my partner tends to withdraw"), and Common DC (5 items; e.g., "We engage in a serious discussion about the problem and think through what has to be done"). The remaining two single items assessed satisfaction with, and efficiency of, DC.

Some items of the Stress communication, Supportive DC and Common DC subscales specifically reflect emotion-oriented strategies, while others reflect problem-oriented strategies. Apart from the two single items and the Common DC subscale, each subscale is available in self and partner-report forms with parallel items. The DC by self subscales assess the participants' own communication of stress and DC responses to the other's stress, while the DC by partner subscales assess the participants' perception of their partner's communication of stress and DC responses to one's individual stress. Along with its underlying theoretically driven development, this specific design feature is one of the major strengths of the DCI as it allows several comparisons within-person and

between partners. This is particularly useful for researchers interested in examining the degree of similarity/congruence within couples.

For all items, individuals are asked to indicate the frequency of each statement on a 5-point response scale ranging from 1 (*very rarely*) to 5 (*very often*). Several total scores can be obtained from the DCI. For each subscale, we can compute a total mean score (range 1 – 5), with higher scores indicating more of the respective behavior. In addition, within each subscale, the scores on the items reflecting emotion and problem-oriented strategies, respectively, can be combined to provide a score of each orientation. The DC by self and by partner subscales can be grouped (after the score for the negative DC subscale have been reversed) into two composite scores of DC by self (average of the 15 items) and by partner (average of the 15 items), with higher scores indicating more positive DC in oneself and in the partner, respectively. A global score of positive forms of DC (i.e., supportive, delegated and common) can also be obtained by computing the mean of the respective items. Finally, it is possible to compute a total score of DC by averaging all the items (except the two single items regarding DC evaluation) after reverse coding the items corresponding to the negative DC subscale. A higher value is thus indicator of better DC.

2.3.6.2. Adult attachment

The Experience in Close Relationships – Relationship Structures (ECR-RS; Fraley et al., 2011; PV: Moreira, Martins, Gouveia, & Canavarro, 2015) was used in our study to assess attachment representations towards the romantic partner, which are likely to become more activated during the perinatal period (Simpson & Rholes, 2018). This 9-item instrument assesses attachment-related anxiety (3 items; e.g., "I often worry that this person doesn't really care for me") and avoidance (6 items; e.g., "I don't feel comfortable opening up to this person") in four types of close relationships (with the mother or mother-like figure, father or father-like figure, romantic partner, and best friend). Each relational domain is assessed by the same nine items, which are rated on a 7-point response scale (1 = *strongly disagree* to 7 = *strongly agree*). A total score for each subscale (Anxiety and Avoidance) can be computed from the mean of the respective items (range 1 – 7), with higher scores indicating higher attachment-related anxiety and avoidance, respectively. Because a better understanding of the dyadic processes within the couple's

relationship constitutes a major objective of this research project, only the romantic partner domain was considered in our study.

2.3.7. Cognitive variables

2.3.7.1. Negative automatic postpartum thoughts

The Postnatal Negative Thoughts Questionnaire (PNTQ; Hall & Papageorgiou, 2005; PV: Rodrigues, Costa, Canavarro, & Fonseca, 2017) is a 17-item self-report questionnaire of the frequency of specific postpartum negative automatic thoughts. The items are answered on a 4-point response scale (from 0 = *not at all* to 3 = *almost always*) and are organized into two dimensions: appraisal of cognition, emotion, and situation (9 items; metacognitive appraisal of thought content; e.g., "It's not normal to think the way I do" and "My situation is completely out of control") and baby-related and motherhood-related negative thoughts (8 items; the content of negative thoughts, e.g., "I am a bad mother" and "I'm trapped in this situation by my baby"). Higher scores indicate a higher frequency of postpartum negative automatic thoughts. Since the PNTQ assesses cognitive factors likely to put women at higher risk for developing PPD, this instrument was considered suitable to establish the convergent validity of the PDPI-R in the pilot study (empirical study I).

2.4. Data analysis

The statistical options employed to respond to the specific objectives of the empirical studies are described in the appropriate section within the studies (see Chapter III). In this section, we will present some crosscutting analytical aspects of the studies within each empirical research phase.

2.4.1. Research phase I: ROC analyses

In both empirical studies of research phase I, we used the receiver operating characteristic (ROC) analyses to estimate the preliminary (empirical study I) and complete (empirical study II) predictive validity of the PDPI-R. Due to space constraints, the basic principles of this statistical procedure were not extensively elaborated in the papers. Hence, this topic will serve this purpose.

The ROC analyses have been widely used in the medical sciences to establish and compare the accuracy of screening and diagnostic instruments. This method provides two kind of information: a general accuracy estimate and specific accuracy estimates. Regarding the former, ROC analyses compute the global performance of an instrument in identifying which individuals would or would not experience a given event (in our case, PPD) as determined by a reference or "gold standard" method (in our case, EPDS and SCID-I). This estimate, designed by area under the curve (AUC), is calculated from all possible cut-off scores of the instrument and it is an important indicator of the discriminatory power of a screening test. Secondly, ROC analyses allow the selection of appropriate cut-off scores for instruments that yield continuous quantitative data (such as the PDPI-R) considering the most optimal balance between sensitivity and specificity. This is accomplished by the computation of a plot (ROC curve; see Figure 4) of the true positive rate (sensitivity) against the false positive rate (100–specificity) for all possible cut-off scores of the instrument.

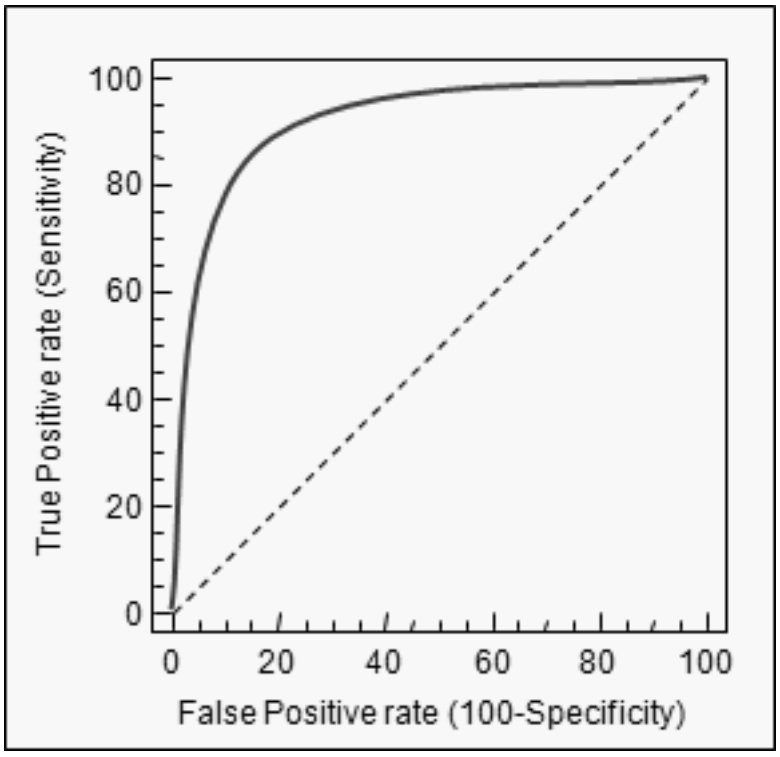

Figure 4 | Graphical representation of the ROC curve (MedCalc Software, 2019, reproduced with permission from the authors)

Briefly, each operating point on the ROC curve corresponds to the combination of sensitivity and 100–specificity that a diagnostic test is able to provide at a given cut-off score, with higher ROC curves (i.e., higher AUC) indicating greater diagnostic accuracy. In addition, ROC analyses turn possible to visually and simultaneously compare two alternative instruments (e.g., the prenatal vs. postnatal versions of the PDPI-R), which constitute an important advantage of this technique (for a general overview of ROC analyses basic principles, see Greiner, Pfeiffer, & Smith, 2000; Metz, 2006; van Erkel & Pattynama, 1998). Beyond these estimations directly yielded by the ROC analyses, three additional important components could be obtained through a classical 2x2 contingency table designed for each cut-off score (see Figure 5): the positive and negative predictive values (PPV and NPV, respectively) and the misclassification rate (MR).

		Postpartum depression	
		Presence	**Absence**
PDPI-R	**Positive screen**	A True positive rate (*sensitivity, positive predictive value*)	B False positive rate (type I error)
	Negative screen	C False negative rate (type II error)	D True negative rate (*specificity, negative predictive value*)

Figure 5 | Two-by-two contingency table of the PDPI-R's accuracy

Based on Trevethan's (2017) systematization, Figure 5 illustrates the reasoning behind all these validity indicators as applied in our study: sensitivity refers to the proportion of women who had PPD and had a positive screen on the PDPI-R [(A/(A+C))*100 in the figure], while specificity refers to the proportion of women who had not PPD and had a negative screen on the PDPI-R [(D/(D+B))*100]. PPV represents the likelihood to have PPD if women have a positive screen on the PDPI-R

[(A/(A+B))*100], while NPV corresponds to the likelihood to not have PPD if women have a negative screen on the PDPI-R [(D/(D+C))*100]. Finally, the MR comprises the proportion of all the cases misidentified by the PDPI-R [(C+B)/(A+B+C+D)].

Practically speaking, sensitivity and specificity answer the question "How many positive and negative cases of PPD have been correctly identified by the PDPI-R?" and the PPV and NPV answer the question "If a woman has a positive or negative screen on the PDPI-R, what would be her probability to have or not to have, respectively, PPD?". Contrary to specificity and sensitivity, PPV and NPV are a function of the prevalence of cases (i.e., when the prevalence is low, the PPV values tend to be lower and the NPV values higher; Kozinszky & Dudas, 2015). The reporting of all these indicators has been strongly recommended (Trevethan, 2017).

2.4.2. Research phase II: Dyadic analyses

In the empirical studies of research phase II (Studies III to VI), the couple was considered the unit of analysis, which means that we take into account the *nonindependence* between members of a couple. The concept of nonindependence – the core assumption of dyadic data analysis – emphasizes that two members of the same dyad are more similar to (or dissimilar from) one another than are two individuals who are not members of the same dyad (Kenny et al., 2006). Nonindependence in couples can be attributable to four factors (Kenny, 1996): a) the prior similarity, even before individuals meet and became a couple (compositional effect); b) the occurrence of partner effects (i.e., when a partner's characteristic or behavior affects the other partner's outcomes); c) the mutual influences within couples (i.e., both partner's influence one another); and d) the occurrence of common fate effects (i.e., when partners are exposed to the same events and influences).

Expecting/having a child is a shared and common experience between the members of a couple (Cowan & Cowan, 2000; McGoldrick & Carter, 2003; Perry-Jenkins & Claxton, 2011), as they experience the *same* pregnancy and navigate the *same* postpartum period. Consequently, the interplay between two partners within a couple – in which each partner's cognitions, behaviors and emotions influence one another – is likely to be different from the interplay between two members of different couples. This line of thought is supported by the large empirical evidence regarding partners' emotional

interdependence during the perinatal period (e.g., Cameron et al., 2016; Goodman, 2004a; Wee et al., 2011). In addition, European Portuguese couples are highly interdependent by nature, likely due to the collectivist culture in which they are embedded (Vedes et al., 2016). Therefore, if ignoring the nonindependence of dyadic data may lead to biased results in general (e.g., by increasing Type I and Type II errors; Ackerman et al., 2010), taking into consideration partners' interdependence[18] assumes even more relevance when analyzing data collected from Portuguese couples during the perinatal period.

For each empirical study of research phase II, the dataset was structured to consider each couple as a separate observation (i.e., a single unit of analysis), which comprises two scores for individual-level variables – one for each member of the couple (e.g., women and men' depressive symptoms) – and a single score for dyad-level variables (e.g., relationship length). Consequently, the total number of observations/sample size was the total number of dyads[19]. In empirical study III, the nonindependence of the partners was addressed by computing multivariate analyses of covariance for repeated measures, entering gender as the within-subjects factor. This allows examining gender similarities or differences within-dyad. Moreover, by additionally entering a between-subjects factor (in our study, group: couples with a woman with a positive vs. negative EPDS screen), it allows estimating between-dyad similarities or differences, as well as interaction effects of gender x group. In the remaining studies (Studies IV to VI), the Actor-Partner Interdependence Model (APIM; Cook & Kenny, 2005) approach was used, which allows to simultaneously estimate the effects of one partner's characteristics on one's own (actor effects) and the other's (partner effects) adjustment, while controlling for each other. The key idea of this approach is that partners' outcomes are a function of both the individuals' and their partners' characteristics, in which the estimation of partner effects offers a rigorous way to test hypotheses, as they are not subject to typical shared method variance biases (Ackerman et al., 2010). An extension of the APIM for testing direct and indirect effects (Ledermann, Macho, & Kenny, 2011) was used in study V and an adaptation of the APIM for examining the effects of combined scores (profile similarity measures), both at the individual (perceived/within-person similarity) and couple-level (actual/between partners

[18] Nonindependence (or interdependence) of partners' observations was assessed in our studies by computing Pearson correlations between both partners' scores.

[19] In this way, the assumption of independence, which postulates that "once variation due to the independent variables is controlled, the scores of different units are independent" (Kenny et al., 2006, p. 25), present in commonly used statistical procedures (e.g., analysis of variance [ANOVA], multiple regression), is not violated.

similarity), was used in empirical study VI. The different applications of the APIM are described in detail in the appropriate section of the respective studies (see Chapter III).

All the APIMs conducted in those studies used a prospective longitudinal design and were performed in a structural equation modelling (SEM) software package (Mplus; Muthén & Muthén, 1998-2017), which allows the direct assessment of how well a proposed model fits the data using fit indices, the test of mediational effects in a straightforward way and of models with latent variables (which enable researchers to account for the effects of unreliability of measurement), and the use of more advanced methods to handle missing data (e.g., full information maximum likelihood; FIML[20]) (Ledermann & Kenny, 2017). Specifically in empirical study IV, we carried out univariate latent change score (LCS) models to estimate change over time – which is equivalent to a paired *t*-test (Coman et al., 2013) – and bivariate LCS models – which allows examining change-to-change effects (Henk & Castro-Schilo, 2016). In the remaining longitudinal studies (study V and VI), traditional methods (paired *t*-test) were used to assess differences over time (as well as gender differences within couple), due to power issues. In addition, SEM techniques allow us to test for equality constraints on the basic APIM, which are particularly useful to determine the presence of gender differences in relationship processes (e.g., to test whether actor effects are statistically different for each partner; Ackerman et al., 2010; Kenny et al., 2006) and then to obtain the most parsimonious models (i.e., when actor effects and partner effects, respectively, could be set as equal across gender without significant declines in model fit); this strategy[21] was applied in all

[20] FIML is the standard missing estimation method of SEM techniques and has been considered as a state-of-the-art missing data technique because it yields unbiased parameter estimates under conditions of missing-at-random and multivariate normality (Enders & Bandalos, 2001; Enders, 2010). FIML has been shown to be superior to traditional techniques such as deletion because it "maximizes statistical power by borrowing information from the observed data" (Enders, 2010, p. 87). That is, this principle-based method neither impute missing data nor exclude cases with missing scores but rather uses all the information available in the incomplete data set. FIML has been considered particularly advantageous in dyadic research, as "it uses all the data, and even dyads in which both members do not provide a score on the outcome are included in the analysis, assuming that at least one of them provides an *x* score" (Ledermann & Kenny, 2017, p. 4). In all our longitudinal studies, we used FIML to handle missing data at the composite/factor level. Specifically, in study IV, all the couples retained at T1 (n = 303) were analysed, regardless of their participation at T2, which allows us to use available data from one partner at T2 despite missing data from the other partner. In study V and VI, because of the significant attrition rate from T1 to T3 (70%), we opted to retain only the couples that completed all the assessment times; therefore FIML was performed to account for missingness within the 92 couples that completed the study. In this case, this approach allowed us to use available data for a given variable from one couple despite missing data in another variable.

[21] We started by examining the fit of a full constrained model (i.e., actor effects and partner effects, respectively, were fixed as equal for women and men). If the model yields a non-significant qui-square value (p > .05), this suggests that women and men are *empirically indistinguishable*, and then there will be only one estimate for the actor effects and one estimate for the partner effects; on the other hand, a rejectable qui-

our studies that used SEM (Studies IV to VI). The flexibility of SEM techniques in defining the parameters to be estimated in a given model is considered one of its key strengths (Ledermann & Kenny, 2017). Finally, a cross-cutting analytical aspect taken into account in all the longitudinal studies was the nonindependence of the observations over time, by controlling for the scores of the variables assessed at previous times. A full description of these data-analytic strategies is present in the appropriate section of the respective studies (see Chapter III).

2.4.3. Statistical power and estimation of effect sizes

Since recruiting couples and retaining participants in longitudinal studies may entail logistic difficulties (Wittenborn et al., 2013), and accounting for 50% of attrition rate over a 9-month follow-up, we recruited a larger number of women/couples (about 500) to achieve a satisfactory sample size (300 women/couples) to test our hypotheses. The number of participants varied between the empirical studies, and for each study, the statistical power (i.e., the probability of rejecting a false null hypothesis) was established a *posteriori*, with the G*Power computational tool (Faul, Erdfelder, Lang, & Buchner, 2007). Statistical power depends on the sample size (*n* of women/couples), the level of significance (α = .05) and the power of the test (.80). Overall, considering our different samples (research phase I and II), the *post-hoc* power analyses suggested that medium-to-large effects could be detected (effect size for univariate and multivariate analyses of variance: $f \geq 0.25$; effect size for multiple regression[22]: $f^2 \geq 0.15$ (Cohen, 1992). Although smaller effects could have been missed due to our sample size (and then increasing the probability of making type II errors), as proposed by Cohen (1988), we considered type I errors more serious that type II errors, and therefore the statistical significance of our results was set at the conventional level of significance $\alpha < .05$ (this means that the probability of making a type I error is up to 5%; Ellis, 2010).

square value ($p < .05$) suggests that at least one pair of path coefficients was significantly different between women and men (i.e., there is evidence of empirical distinguishability in some domain) (Ackerman et al., 2010). In these cases, to address model misspecification, the paths were successively unconstrained based on specific indicators.

[22] Although a power analysis algorithm has been developed specifically to estimate power for the APIM (APIMPowerR; Ackerman & Kenny, 2016, December), its current version is only designed to handle the cross-sectional APIM with a single mixed predictor. Accordingly, power analyses were conducted as for ordinary multiple regression analysis (Kenny & Cook, 1999). It should be noted that there is no easy way to determine power in SEM analyses and we suppose that we would be underpowered as SEM requires large sample sizes; Ledermann and Kenny (2017) propose "that between 80 and 100 dyads might be a better minimum for SEM APIM analyses, but we await a more definitive analysis" (p. 5).

Following the recommendations of the American Psychological Association (APA, 2010b), the effect sizes of our findings and the respective interpretation (small, medium and large effects; Cohen, 1992) were reported in the empirical studies. For the comparison tests (multivariate analyses of variance, *t* test and qui-square), the effect sizes were estimated through the partial eta squared (η_p^2), Cohen's *d*, and the phi coefficient (φ_c) or Cramer's V, respectively; in the correlation analyses, through the Pearson's product moment correlation coefficient (*r*), and in the APIM analyses, through the coefficient of determination (R^2 as for ordinary multiple regression analyses) (Cohen, 1992). The reporting of effect sizes complements the information about the statistical significance obtained for a given test, as it allows quantifying the practical relevance of a result (e.g., for the society) and making comparison between studies (Ellis, 2010).

2.5. Ethical considerations

All the procedures adopted during the conception and implementation of the present research project, as well as on the dissemination of the results, were carried out in accordance with important national (Order of Portuguese Psychologists; Regulation number 258/2011, April 20th, 2011) and international (the APA ethical principles regarding research with human participants; APA, 2010a and the World Medical Association declaration of Helsinki; 1964, as revised in 2013) ethical standards on human experimentation. These ethical recommendations highlight that research with human subjects should prioritize participants' rights, dignity and best interests and, importantly, comply with general principles that were considered in the distinct stages of this project[23].

2.5.1. Conception of the research project

Considering the principle of *Beneficence and Non-maleficence*, the potential benefits of our study to the science and community as well as risks and burden associated with participation in research were pondered when defining the design of our study. The respect for this principle was shown in the careful selection of the instruments (i.e., we privileged short questionnaires and easy to complete in terms of comprehension), assessment times (e.g., the participants were assessed once during pregnancy in order to

[23] Because the data used in the empirical study I were collected within the context of the ongoing postdoctoral project, in this section, we will only present details pertaining to the conception and implementation of the longitudinal study, which is specific to the present PhD research project. Ethical considerations regarding the dissemination of the results will refer to all empirical studies (Studies I to VI).

avoid participants' response burden; participants were only sent the T2 assessment protocol in case of acknowledged successful delivery; women were allowed to define the most ideal time to answer the SCID-I), and place for completing the questionnaires (i.e., participants were allowed to complete the first assessment time at the maternity or at home to safeguard privacy). In addition, relevant procedures about the initial contact with the participants were previously debated with members of the research team to ensure participants' wellbeing and privacy (i.e., a brief description of the study was made by the obstetrician, with whom women already have a trust relationship[24], and only after the first trimester of pregnancy, as it is a more critical period in terms of the occurrence of gestational complications).

The main researcher of this project is a qualified clinical psychologist, with an Integrated Master's degree in Clinical and Health Psychology, as well as previous experience in clinical practice (namely at the Psychological Intervention Unit [UnIP] of the MDM). During the preparation of the study (and stages beyond), the same researcher attended relevant conferences, workshops and short-length courses, discussed features of the project with other members of the research group *Relationships, Development & Health* and studied relevant literature to improve and update her knowledge (conceptual and methodological) in the field of perinatal and dyadic research. Therefore, the researcher complied with the ethical principle of *Competence*, especially relevant for the realization of the SCID-I interviews and computation of complex dyadic data analysis. After these initial considerations regarding the potential risks and benefits of the study, the researchers involved in this project elaborated a rigorous proposal to be submitted to the Ethics Committees of the Faculty of Psychology and Education Sciences of the University of Coimbra and hospital where the study was conducted[25].

2.5.2. Implementation of the research project

After approval of the respective Ethics Committees, the data collection phase took place following the procedures previously described in the proposal and in accordance with the general principle of *Respect for People's Rights and Dignity*. Subsequently to giving

[24] This trust relationship may also let women more comfortable about other family members (i.e., their partners) participating in the study (Wittenborn et al., 2013), which is particularly relevant in obstetric settings, as a personal contact with the woman's partner is not always suitable and it is the woman that decide the extent to which the study is further presented (or not) to the other member.

[25] Attending to the inter-connections between this PhD research project and postdoctoral project currently in course at the same Research Unit, a single proposal was submitted and further approved.

permission to be contacted by the researcher, all women/couples were provided oral information about the objectives of the research, inclusion criteria, procedures and expected duration of the data collection (i.e., follow-up by post with not financial costs and need of additional displacements for the participants; sending of text messages to remember completion and delivery of the questionnaires), risks and benefits of the study, confidentiality of their responses [26] and collective analysis of the data, voluntary participation (without financial or other compensation) and right to withdraw at any time (without consequences regarding women's medical follow-up at the maternity). Women/couples were allowed to clarify any aspect of these terms with the researcher, and those who agreed with these procedures were asked to sign an informed consent form[27], which contains all the information presented verbally, including details about the researcher's role (e.g., compliance with ethical considerations), institutional affiliations and contact information for any questions concerning the participation or to obtain any kind of support.

Because this research project was developed in collaboration with the UnIP, all women/couples, regardless of their willingness to participate in the study, were informed about this service in case they would need psychological support. Specifically during the SCID-I interview process, women who communicated current psychological difficulties were encouraged to obtain professional support either at the UnIP or other services in their area of residence (in the former case, the researcher made the respective referral). While conducting the interview, the researcher was always available to listen for as long as needed and briefly address relevant concerns reported by the participants (e.g., normalization of emotional reactions).

[26] This aspect assumes an even more importance when collecting data from couples. Partners may refrain that their (negative) personal thoughts and feelings to one another, self-reported on the questionnaires, would be openly disclosed, and then this may be a reason for couple's participation refusal; consequently, by ensuring the confidentiality of the data (both from one partner to the other and regarding other people) may enhance the participation of a diversity of couples and not only those with positive relationships (Wittenborn et al., 2013).

[27] Whenever possible, the researcher made several efforts to speak with *both* partners (e.g., waiting for a time in which both partners were available), so both women and men willingness to participate could be directly assessed; when a direct contact with partners was not considered suitable, the researcher presented the study to the women, requesting that they disclose the information about the study to their partner (along with the informed consent that should be signed by their partner and returned to the researcher). To minimize the risk of potential coercion of men by women, women were told that, regardless of their partner's participation, their individual contribution would allow the accomplishment of other objectives of this research project (adaptation of the PDPI-R) and, thus, would be considered valid.

Finally, the participants' right of *privacy* and *confidentiality* was guarantee by several strategies: a) the sociodemographic and clinical datasheets only included the personal information strictly necessary for the sample's characterization, which was kept strictly confidential; b) an identification code was assigned for each participant's assessment protocol, which was kept separated from any document that contains personal identification such as medical records and signed consent forms (this unique code facilitated follow-up over time without identifying the participants); c) during the follow-up assessment times, we sent the self-report questionnaires along with a pre-stamped envelope in which to return the assessment protocol; this envelope only contained the address of the recipient (research team), without information about the sender (participants); and, d) the data were inserted in an electronic database and analyzed collectively.

2.5.3. Publication and dissemination of the results

Finally, the researcher also complied with the ethical principle of *Integrity* and *Social Responsibility*, by analyzing the data and disseminating the results of this research project in an accurate and honest way. The results were derived from original and not distorted or invented data, and both the positive and inconclusive/unexpected results were shared with the scientific community (through scientific papers submitted and published in peer-reviewed journals, as well as oral and poster presentations in national and international meetings). Specifically in the scientific papers, we carefully attended to the following aspects: a) any ideas of third parties cited by us have been appropriately attributed to the original authors, in order to avoid plagiarism; b) each empirical study presents original and not duplicated findings previously presented, thus not incurring in replication of results; c) the authorships were defined according to the contribution of the authors to the manuscript preparation, regardless of their relative status; and, d) each empirical study was submitted/published along with statements regarding the sources of funding and conflicts of interest.

The main findings of our study were also made available to the general population, through the webpage of the Research Centre (http://cineicc.uc.pt/) and of the research group (http://www.fpce.uc.pt/saude/), and a flyer summarizing the main conclusions of the study, in an accessible language, will be send by post to the participants that completed the study, acknowledging each individual contribution.

Chapter III

Empirical Studies and Systematic Review

Empirical study I

Preliminary Psychometric Testing of the Postpartum Depression Predictors Inventory-Revised (PDPI-R) in Portuguese Women

Stephanie Alves • Ana Fonseca • Maria Cristina Canavarro • Marco Pereira

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Abstract

Introduction Postpartum depression (PPD) is a prevalent condition with a serious impact. The early identification of women at risk for developing PPD allows for primary prevention and the delivery of timely appropriate referrals. This study investigated the validity and reliability of the postnatal version of the Postpartum Depression Predictors Inventory-Revised (PDPI-R), an instrument widely studied internationally, in Portuguese women. *Methods* The sample consisted of 204 women who participated in an online cross-sectional survey. Participants completed the European Portuguese versions of the PDPI-R, the Edinburgh Postnatal Depression Scale (EPDS), and the Postnatal Negative Thoughts Questionnaire at 1–2 months postpartum. Additionally, ROC analyses were performed to conduct an exploratory analysis of the instruments' predictive validity. *Results* The prevalence rates of clinical postpartum depressive symptoms were 27.5 and 14.2% using the cut-off scores of 9 and 12, respectively, on the EPDS. The European Portuguese postnatal version of the PDPI-R demonstrated acceptable reliability and satisfactory construct and convergent validity. When using the EPDS > 9 cut-off score, the exploratory analyses yielded a sensitivity of 76.8% and a specificity of 73.0% with a cut-off score of 5.5 [area under the curve = 0.816]. *Discussion* These preliminary findings encourage the use of the postnatal version of the PDPI-R as a screening tool to identify Portuguese women at high risk for developing PPD. Subsequent assessments are needed to support the routine application of the PDPI-R both in research and for clinical purposes.

Keywords: Postpartum depression • Risk factors • Screening • Validity • Reliability

Introduction

Postpartum depression (PPD) is a public health concern (O'Hara & McCabe, 2013) due to its high prevalence (Norhayati, Nik Hazlina, Asrenee, & Wan Emilin, 2015), persistent nature across the first year postpartum and beyond (Goodman, 2004) and well-documented adverse consequences on mother-child interactions, child development, and partnership and relationship well-being (O'Hara & McCabe, 2013; Westall & Liamputtong, 2011). In Portugal, between 8.6% and 26.7% of women develop PPD (or symptoms thereof) in the first three months postpartum (Norhayati et al., 2015), with recent prevalence estimates of clinical postpartum depressive symptoms reaching 19.6% at 6 weeks postpartum (Pereira et al., 2016). However, PPD symptoms are often undetected in health care settings mostly because of a lack of systematic screening for PPD (Wilkinson, Anderson, & Wheeler, 2016), and few women seek professional help to manage their depressive symptoms, including in Portugal (Fonseca, Gorayeb, & Canavarro, 2015).

In Portugal, primary health care and maternity care settings did not routinely screen for PPD or related risk factors, whereby women's access to treatment depends largely on their own request (Fonseca et al., 2015). However, the integration of screening procedures in Portuguese maternity care settings is supported by the timely opportunity (women are routinely followed to 6 weeks after childbirth), the availability of psychosocial services in major Public Maternity Hospitals and General Hospitals allowing appropriate referrals, and the favourable acceptability of screening tools for perinatal depression among women and health professionals (Pereira et al., 2016).

Recent international guidelines (Austin, 2014) recommend screening procedures that combine the assessment of current depressive symptoms and the assessment of past and current psychosocial risk factors, ideally conducted in both the antenatal and postnatal periods. Unlike PPD screening that aims to identify women with a possible diagnosis at the time of assessment (e.g., by using the Edinburgh Postnatal Depression Scale [EPDS]), this complementary assessment allows us to early identify and address women's psychosocial vulnerabilities that may increase their risk of developing PPD (Beck, 2002; Beck, Records, & Rice, 2006). This is an important question because even if not clinically depressed at the time of assessment, women may develop clinical depressive symptoms across the first 12 months postpartum.

A variety of risk factors associated with the development of PPD has been studied (Beck, 2001; Norhayati et al., 2015), and research also underscores the important role of cognitive factors (Hall & Papageorgiou, 2005), namely, their interaction with other risk factors in predicting PPD (Church, Brechman-Toussaint, & Hine, 2005). Based on these, numerous screening tools have been developed to identify women who are at risk for PPD (Johnson et al., 2012), but present some important limitations: the majority do not cover the multiple PPD risk factors broadly investigated (e.g., specific postpartum predictors such as infant temperament; Beck, 2002; Beck et al., 2006), and some of them are only administered during pregnancy (e.g., Pereira et al., 2016). Recently, Pereira et al. (2016) developed an antenatal tool to predict perinatal depression among European Portuguese women. This tool comprised four self-report questionnaires that assessed current depressive symptoms and three risk factors (insomnia, negative affect, and lifetime history of depression). Notwithstanding this important contribution, some alternatives should be tested, which would be quicker to complete and interpret and that could also be administrated after childbirth, considering postpartum-related risk factors.

The Postpartum Depression Predictors Inventory (PDPI; Beck, 1998) represents a valid alternative option. The PDPI was revised based on an updated meta-analysis on PPD risk factors (Beck, 2001) to include 13 significant antenatal and postpartum risk factors associated with the development of PPD (PDPI-R; Beck, 2002; Beck et al., 2006). In clinical settings as well as for research purposes, the PDPI-R can be used in two ways: (a) as a self- report measure, quickly and easily completed, without excessive time demands for both women and health professionals, and (b) as a mean to start the discussion of any problems women may be experiencing regarding each risk factor (as originally developed) (Beck et al., 2006; Oppo et al., 2009). A total score of the 13 risk factors can be computed and compared with the defined cut-off score, which allows quickly identifying women at higher risk of PPD.

The PDPI-R has been shown to be acceptable by Japanese mothers (Ikeda & Kamibeppu, 2013) and Australian nurses (Hanna, Jarman, Savage, & Layton, 2004). In comparison with the EPDS, the PDPI-R is not limited to a total scale score for depression, but enables a more comprehensive assessment of the woman's situation, as each of the risk factors is assessed (Beck et al., 2006), whereby its routine use in clinical practice has been recommended (Hanna et al., 2004; Oppo et al., 2009). Recently, the PDPI-R has also

been adapted to estimate the risk of parental depression in the context of postadoption (Foli, South, Lim, & Hebdon, 2016).

Because PPD is a universal experience, translating the PDPI-R into different languages is required to make the inventory available to non-English-speaking women (Beck et al., 2006). Importantly, despite its relatively universality, the experience of PPD may differ across countries and cultures (Evagorou, Arvaniti, & Samakouri, 2016). Moreover, although the PDPI-R was based on risk factors globally established, culturally-specific beliefs and postpartum practices may impact the magnitude of each risk factor differently across cultures. Then, to avoid misclassification of risk, testing how the inventory fits to each specific context (i.e., to develop a culturally sensitive cut-off score) is deemed necessary.

The validation of the PDPI-R have been conducted in various countries (Ibarra-Yruegas, Lara, Navarrete, Nieto, & Valle, 2016; Ikeda & Kamibeppu, 2013; Oppo et al., 2009; Youn & Jeong, 2011), which in line with the results of the original version (Records, Rice, & Beck, 2007) have revealed satisfactory psychometric properties, supporting its validity and reliability. However, because the instrument's psychometric properties have not yet been examined in Portugal, the aim of this study was to assess the validity and reliability of the postnatal version of the PDPI-R (self-report version) in Portuguese women.

Methods

Participants and procedures

This study was part of a larger project approved by the Research Ethics Committees of the Faculty of Psychology and Educational Sciences of the University of Coimbra and one Portuguese university hospital (Centro Hospitalar e Universitário de Coimbra) to understand the motherhood experience of women during the postpartum period (up to 12 months after childbirth). Postpartum women were invited to participate in the study through a variety of local and online advertisements between December 2015 and March 2016. All women were Portuguese-speaking and aged 18 years or older (inclusion criteria), participated voluntarily and were not compensated for their participation. The data were collected through an online survey, which included

information about the study aims and the ethical considerations regarding confidentiality and anonymity on the introductory page. Participants provided their informed consent by answering a question about their agreement to participate in the study.

Although 480 participants completed the survey, for the present study, only women who completed the questionnaires during the first or second months postpartum (*N* = 204) were included for two reasons. First, because previous original and validation studies have administrated the postnatal version of the PDPI-R between 3 and 8 weeks postpartum. Second, since we were interested in providing valuable information for clinical practice, we opted to select women who have filled out the inventory at a time in which they simultaneously (a) are still in regular contact with the obstetric or primary health care services and (b) tend to present a high prevalence of clinical PPD symptoms (Pereira et al., 2016).

Measures

Postpartum Depression Predictors Inventory-Revised

The PDPI-R is an inventory of risk factors for PPD that comprises two versions: (1) a prenatal version with 10 risk factors (marital status [being single], low socioeconomic status, low self-esteem, prenatal depression, prenatal anxiety, pregnancy intention [unwanted/unplanned], history of previous depression, lack of social support [from partner, family and friends], marital dissatisfaction, and life stress), and (2) a postnatal/full version with the factors assessed in the prenatal version and three additional risk factors (child care stress, difficult infant temperament, and maternity blues). The number of items assessing each factor and the corresponding score range were specified in Table 1. The prenatal version contains 32 items and the postnatal version comprises 39 items. Except for the first two items (see Table 1), women were asked to answer "yes" or "no" to each item, which response is scored with a "0" (indicating the absence of risk) or "1" (indicating the presence of risk). A total score for each risk factor and version of the scale is obtained from the sum of all items, with higher scores indicating increased risk for PPD (Beck et al., 2006). The prenatal version (administered during pregnancy) total score ranged from 0 to 32, and the postnatal version (administered after childbirth) total score ranged from 0 to 39. In this study, we only used the postnatal version.

The authors translated the PDPI-R into European Portuguese after obtaining permission from the original author, and the translated version was then back-translated into English to establish semantic equivalence. Because the items of the PDPI-R are brief and simple, and were all relevant to the Portuguese context, the items were literally translated, with only minor alterations to clarify the meaning of each item.

Edinburgh Postnatal Depression Scale

The EPDS (Cox, Holden, & Sagovsky, 1987; Portuguese version: Areias, Kumar, Barros, & Figueiredo, 1996), a 10-item self-report inventory of antepartum and postpartum depressive symptoms, was used to determine probable depression (cut-off score above 9). Each item was rated using a 4-point response scale, with higher scores reflecting more depressive symptoms. In this study, Cronbach's α was 0.87. This scale was used to assess convergent and predictive validity.

Postnatal Negative Thoughts Questionnaire

The Postnatal Negative Thoughts Questionnaire (PNTQ; Hall & Papageorgiou, 2005), a 17-item self-report questionnaire that assesses negative postpartum thoughts, was used to assess convergent validity. It includes two dimensions: appraisal of cognition, emotion, and situation (Cronbach's α = 0.89) and baby-related and motherhood-related negative thoughts (Cronbach's α = 0.74). Each item was rated from 0 (*not at all*) to 3 (*almost always*), with higher scores indicating more negative postpartum thoughts.

Statistical analysis

Data were analysed using the Statistical Package for Social Sciences (IBM SPSS 23.0). Chi-square tests were conducted to assess differences in categorical variables, and a univariate analysis of variance (ANOVA) was performed to compare subgroups of women in the continuous variables. Internal consistency reliability was estimated using Cronbach's alpha and Kuder-Richardson-20 (KR-20) for dichotomous data. Pearson's correlations were performed to assess construct and convergent validity, and known-groups validity was assessed using an ANOVA to determine differences in PDPI-R according to EPDS cut-off points. Preliminary predictive validity (sensitivity, specificity, positive predictive value [PPV], and negative predictive value [NPV] for different cut-off

points) was analyzed through Receiver Operating Characteristic (ROC) analyses. The accuracy of the instrument in predicting which women would or would not have PPD was obtained by the area under the curve (AUC), which classified the accuracy as "low" (0.5-0.7), "moderate" (0.7-0.9), and "high" (0.9-1) (Swets, 1988). Scores higher than 9 and 12 on the EPDS were used as the gold standard. Statistical significance was set at $p < .05$.

Results

Participants' characteristics

The sample consisted of 204 women with a mean age of 32.75 years (*SD* = 4.64; range: 19-43). Most women had a university education (*n* = 143, 70.1%), were married/cohabitating (*n* = 177, 86.8%), were employed (*n* = 165, 80.9%) and were living in an urban area (*n* = 123, 60.3%). The majority of women had no other children (*n* = 135, 66.2%) and did not report current pregnancy complications (*n* = 137, 67.2%). The prevalence rates of clinical depressive symptoms were 27.5% and 14.2% according to the EPDS cut-off points used (EPDS > 9 and EPDS ≥12, respectively).

Prevalence of risk factors

The prevalence of the PDPI-R risk factors of the total sample and according to the EPDS cut-off points is summarized in Table 1. A high percentage of women, particularly those with an EPDS cut-off point above 9, reported being depressed in the past, being anxious and depressed during pregnancy and experiencing maternity blues. These women also scored significantly higher on the other risk factors, except for pregnancy intention and marital and economic status. When using a more conservative cut-off score (EPDS ≥12), the same pattern of results was observed.

Table 1 | Prevalence of risk factors for total sample and by EPDS cut-off score

Risk factor (number of items; score range)	Total Sample (*N* = 204)		Women with EPDS > 9 (*n* = 56)		Women with EPDS ≤ 9 (*n* = 148)			
	n (%)	Mean (SD)	*n* (%)	Mean (SD)	*n* (%)	Mean (SD)	χ^2/F	Cramer's V/η_p^2
Being single$_{(1;\ 0\text{-}1)}$[a]	22 (10.8)		8 (14.3)		14 (9.5)		0.98	0.07
Low socioeconomic status$_{(1;\ 0\text{-}1)}$[b]	28 (13.7)		10 (17.9)		18 (12.2)		1.11	0.07
Low self-esteem$_{(3;\ 0\text{-}3)}$		0.19 (0.62)		0.61 (1.04)		0.03 (0.18)	42.03***	0.17
Prenatal depression$_{(1;\ 0\text{-}1)}$	34 (16.7)		18 (32.1)		16 (10.8)		13.31**	0.26
Prenatal anxiety$_{(1;\ 0\text{-}1)}$	130 (63.7)		44 (78.6)		86 (58.1)		7.36**	0.19
Pregnancy intention$_{(2;\ 0\text{-}2)}$		0.20 (0.41)		0.23 (0.43)		0.19 (0.41)	0.44	0.00
Previous depression$_{(1;\ 0\text{-}1)}$	72 (35.3)		30 (53.6)		42 (28.4)		11.29**	0.24
Lack of social support$_{(12;\ 0\text{-}12)}$[c]		1.54 (2.06)		2.80 (2.42)		1.06 (1.68)	33.90***	0.14
Marital dissatisfaction$_{(3;\ 0\text{-}3)}$		0.31 (0.72)		0.59 (0.89)		0.20 (0.62)	12.33**	0.06
Life stress$_{(7;\ 0\text{-}7)}$		0.75 (0.97)		1.14 (1.15)		0.59 (0.85)	13.82***	0.06
Child care stress$_{(3;\ 0\text{-}3)}$		0.48 (0.65)		0.71 (0.78)		0.39 (0.57)	11.05**	0.05
Infant temperament$_{(3;\ 0\text{-}3)}$		0.25 (0.70)		0.46 (0.89)		0.18 (0.59)	7.17**	0.03
Maternity blues$_{(1;\ 0\text{-}1)}$	116 (56.9)		45 (80.4)		71 (48.0)		17.37***	0.29
Total [range 0-39]		5.69 (4.32)		9.32 (4.98)		4.31 (3.08)	74.66***	0.27

Note. EPDS = Edinburgh Postnatal Depression Scale; EPDS > 9 = presence of clinical postpartum depressive symptoms; EPDS ≤ 9 = absence of clinical postpartum depressive symptoms.

[a] Single status [single, separated, divorced, widowed = 1 point; married/cohabitating or in a relationship = 0 point];

[b] Low socioeconomic status = 1 point; middle and high = 0 point;

[c] Social support is assessed by asking women to answer the same four items for three types of relationships (i.e., with their partner, family and friends).

**p < .01; ***p < .001

Construct validity

Significantly positive and small to moderate correlations between the factors of the PDPI-R were found, which ranged from 0.14 (between pregnancy intention and marital dissatisfaction; $p < .05$) to 0.41 (between prenatal depression and previous depression; $p < .001$). The strength of the associations between each factor and the total score ranged from small ($r = 0.19$, $p < .01$ for pregnancy intention) to strong ($r = 0.80$, $p < .001$ for lack of social support). The exception was the factor marital status that was not significantly associated with any of the other factors or with the total score.

Demonstrating known-groups validity, the instrument also discriminated among depressed and non-depressed postpartum women (see Table 1).

Convergent validity

Small to moderate significant and positive correlations were found between the PDPI- R and the PNTQ factors (r range = 0.15-0.56) and between the PDPI-R and the EPDS (r range = 0.17-0.60) (see Table 2). The exceptions were the correlations with marital status and pregnancy intention.

Table 2 | Descriptive statistics and correlations between PDPI-R, depressive symptoms, and cognitive risk factors

	EPDS	PNTQ	
		Appraisal of cognition, emotion, and situation	Baby-related and motherhood negative thoughts
Mean (SD)	6.97 (4.73)	2.60 (3.81)	1.92 (2.22)
[Range]	[0-28]	[0-27]	[0-12]
Being single	-.04	-.04	-.08
Low socioeconomic status	.17*	.12	.04
Low self-esteem	.48***	.50***	.33***
Prenatal depression	.36***	.36***	.24***
Prenatal anxiety	.28***	.23**	.11
Pregnancy intention	.04	.04	.06
Previous depression	.35***	.23**	.22**
Lack of social support	.40***	.42***	.35***
Marital dissatisfaction	.30***	.22**	.13
Life stress	.26***	.28***	.15*
Child care stress	.30***	.28***	.30***
Infant temperament	.20**	.13	.20**
Maternity blues	.34***	.31***	.32***
Total [range 0-24]	.60***	.56***	.44***

Note. The first column presents the 13 risk factors of the Postpartum Depression Predictors Inventory-Revised and its total score; EPDS = Edinburgh Postnatal Depression Scale; PNTQ = Postnatal Negative Thoughts Questionnaire.
*$p < .05$; **$p < .01$; ***$p < .001$

Exploratory analyses of predictive validity

Exploratory analyses were conducted to estimate the predictive validity of the PDPI-R separately for the two EPDS cut-off scores (see Table 3). The ROC analyses indicated an acceptable cut-off score of **5.5** when using EPDS > 9 as the gold standard (Sensitivity = 76.8; Specificity = 73.0; PPV = 51.8; NPV = 89.3; see Figure 1), and a cut-off score of **6.5** when considering EPDS ≥ 12 (Sensitivity = 75.9; Specificity = 76.6; PPV = 34.9; NPV = 95.0).

Table 3 | Exploratory predictive validity of the PDPI-R: ROC analyses

PDPI-R postnatal version	AUC (95% CI)	Cut-off points	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	MR (%)
EPDS > 9	.816 (.747 – .885)	4.5	82.1	64.2	46.5	90.5	30.9
		5.5[a]	76.8	73.0	51.8	89.3	26.0
		6.5	64.3	81.8	57.1	85.8	23.0
EPDS ≥ 12	.823 (.733 – .913)	4.5	86.2	57.7	25.3	96.2	38.2
		5.5	79.3	65.7	27.7	95.0	32.4
		6.5[a]	75.9	76.6	34.9	95.0	23.5
		7.5	72.4	80.6	38.2	94.6	20.6
		8.5	65.5	85.1	42.2	93.7	17.6

Note. PDPI-R = Postpartum Depression Predictors Inventory-Revised; ROC = receiver operating characteristic; EPDS = Edinburgh Postnatal Depression Scale; AUC = area under the curve; CI = confidence interval; PPV = Positive predictive value; NPV = Negative predictive value; MR = Misclassification rate.

[a] Recommended cut-off.

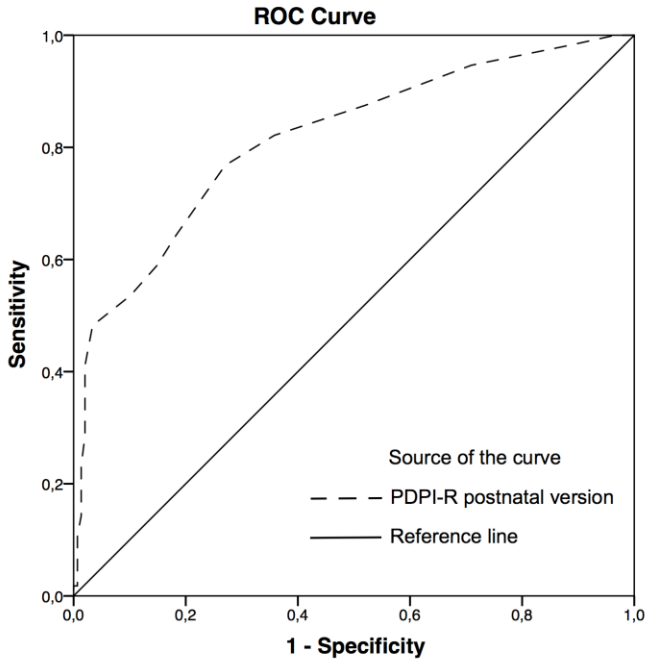

Figure 1 | ROC curve of the postnatal version of the PDPI-R for the detection of probable clinical depression (EPDS > 9)

Reliability

The internal consistency reliability of the PDPI-R postnatal version was acceptable and that of the KR-20 was 0.80.

Discussion

The results of this study support the preliminary psychometric properties of the European Portuguese postnatal version of the PDPI-R. Consistent with previous studies (Ikeda & Kamibeppu, 2013; Records et al., 2007), the findings supported the validity and reliability of the PDPI-R postnatal version as a screening instrument for predicting PPD based on past and current risk. Particularly, the results offered preliminary evidence about the predictive validity of the postnatal version using the EPDS as the gold standard. Similar to other validation studies (Ikeda & Kamibeppu, 2013; Oppo et al., 2009), the PDPI-R accurately predicted 82% of cases with probable depression, suggesting moderate diagnostic accuracy.

The high prevalence of clinical depressive symptoms during the first two months postpartum in this sample was consistent with that reported in recent studies (Norhayati et al., 2015; Pereira et al., 2016) and supported the relevance of routine psychosocial assessment to early identify women with a high risk of developing PPD early, thereby preventing the serious impact of pervasive PPD symptoms on women and their families. Taking advantage of timely opportunities during the postpartum routine obstetric appointment, the total score generated may provide an easier and quicker way to identify women who could benefit from additional psychological support.

Contrary to the original studies on the PDPI-R (Beck et al., 2006; Records et al., 2007) but consistent with recent validation studies, our preliminary analyses demonstrated acceptable cut-off points for the postnatal version of the instrument. When using a cut-off score above 9 on the EPDS, we suggest the same PDPI-R cut-off score of 5.5 that was observed in the postnatal Italian validation (Oppo et al., 2009) despite the fact that these authors used different criteria to diagnose PPD. Overall, our predictive values were similar to those found in the Italian validation, except for a higher PPV observed in our study (51.8% vs. 18.0%). The lower prevalence of depression observed among Italian women (6.7%) may explain this discrepancy, as PPV is sensitive to prevalence values (Kozinszky & Dudas, 2015). In our study, the PPV was not markedly different from that obtained in the Korean validation (59.2%; Youn & Jeong, 2011), which may be explained by the similarly high prevalence rates of clinical depressive symptoms using a comparable gold standard (EPDS ≥ 9.5; 22.5%). However, the recommended cut-off score of 5.5 observed was quite lower than the value of 9.5 obtained in the Korean validation. When using a more conservative gold standard (EPDS ≥ 12), the cut-off score observed in our study was slightly different from the value proposed in the Japanese validation (6.5 vs. 7.5 in Ikeda & Kamibeppu, 2013), and despite the different criteria used for a PPD diagnosis (self-report vs. diagnostic interview), the PPV was also very similar (34.9% vs. 33%).

Youn and Jeong (2011) suggested that the diverse criteria used for PPD diagnosis may account for the different PDPI-R cut-off scores observed across contexts. However, when we compare our results with those of previous studies, we observed similar cut-off scores despite the different criteria used for PPD diagnosis, as well as different cut-off scores when the criteria used to establish PPD was similar. Ikeda and Kamibeppu (2013) highlighted distinct cultural backgrounds as a possible reason for the observed differences. Consistently, the intercultural similarities between Portugal and Italy could explain the

similar observed cut-off score between these two studies. Moreover, when an instrument is translated and adapted into another language and culture, subsequent cross-cultural comparisons require equivalence of measures (or lack of bias) to be valid (Van de Vijver & Tanzer, 2004). The comparisons draw herein may be therefore biased by methodological issues, such as variations in the PDPI-R adaptation process (e.g., the Korean and Japanese versions contain relevant modifications to accommodate culture-specific idiosyncrasies), and administration method (interview used in the Japanese validation, which may induce social desirability, vs. self-reported in the other versions). Future research with the PDPI-R should consider presenting more evidence about the psychometric properties of the adapted versions, as this would facilitate inferences about the versions' equivalence.

Regarding the association between risk factors and PPD, our findings supported more similarities than differences between European Portuguese mothers and Italian and Japanese mothers. In line with existing literature (Evagorou et al., 2016; Norhayati et al., 2015), previous depression, prenatal depression and anxiety, and lack of social support were highly predictive risk factors across cultures. Interestingly, despite different postpartum traditional practices and cultural beliefs towards motherhood between European and Asian countries (Evagorou et al., 2016), the similar findings between the studies under comparison add evidence about cross-cultural similarities in the role of difficulties with emotional and practical aspects of baby care for unhappiness following delivery (Oates et al., 2004).

The inconsistency observed between studies regarding the influence of sociodemographic risk factors (i.e., low socioeconomic status was associated with PPD in Italian and Korean mothers but not in Portuguese and Japanese ones) is consistent with the mixed findings regarding the significance of such factors across countries (Norhayati et al., 2015). In Portugal, the birth of a child often leads to a strong connection with the family of origin (Social Issues Research Centre, 2012), which in a country characterized by unfavourable socioeconomic conditions could play an unquestionable role in helping raising a child. Additionally, despite the precarious circumstances, the experience of motherhood is still a defining component of womanhood in Portugal. It is therefore possible that for Portuguese women, sociodemographic factors are not the main risk factor for PPD. Different times of risk assessment may also account for the discrepancies observed across studies. Indeed, certain risk factors significantly predicted PPD only if

present at certain times (Oppo et al., 2009). Consequently, some factors may increase women's risk for PPD depending of other circumstances.

Given its exploratory nature, this study has major limitations associated with its methods (i.e., absence of a standardized psychiatric interview to determine a PPD diagnosis) and the timing (i.e., cross-sectional study, absence of follow-up) of the PPD assessment. In addition, the recruitment method was based on an online survey with voluntary participation (i.e., mental health concerns/awareness were likely to be higher among participating women) and possible selection bias (i.e., the study was limited to women with Internet access). Despite these limitations, our findings add wide-reaching contributions to this research field. First, they encourage subsequent assessments of the predictive validity of the PDPI-R not only in Portugal (i.e., as women are routinely followed during the course of pregnancy, the validation of the prenatal version is fundamental to allow risk assessment antenatally, which would improve PPD primary prevention), but also in more diverse cultural backgrounds and contexts. For instance, since Portuguese is spoken in many countries worldwide, being the official language of nine countries (Lewis, Simons, & Fennig, 2014), this study would encourage the development of research on PPD risk factors in Portuguese-speaking countries, and then expand the existing research, which has mainly been conducted among English-speaking women. Second, along with the versions available internationally, this study supports the cross-cultural validity of the PDPI-R. Its Portuguese version would be of value for non-Portuguese researchers interested in cross-cultural comparison studies, which then allows testing the hypotheses regarding cultural differences or similarities.

Significance

What is already known on this subject?

Based on the risk factors associated with postpartum depression (PPD), numerous instruments have been developed to predict women's risk of developing PPD. However, the majority of these instruments are not inclusive of specific postpartum risk factors, and some of them are not administered during both the prenatal and postnatal periods. One exception is the Postpartum Depression Predictors Inventory-Revised (PDPI-R), whose psychometric properties have been internationally studied.

What does this study add?

The present study supports the validity and reliability of the Portuguese PDPI-R postnatal version and encourages subsequent assessments of the predictive validity of the PDPI-R in more diverse cultural backgrounds and contexts.

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Empirical study II

Predictive validity of the Postpartum Depression Predictors Inventory-Revised (PDPI- R): A longitudinal study with Portuguese women

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Predictive validity of the Postpartum Depression Predictors Inventory-Revised (PDPI- R): A longitudinal study with Portuguese women

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Abstract

Objective: This study examined the predictive validity of the prenatal and postnatal versions of the Postpartum Depression Predictors Inventory-Revised (PDPI-R) in European Portuguese women, considering two gold standards to determine postpartum depression (PPD).

Design: Prospective longitudinal study conducted between November 2015 and September 2017.

Setting: One public referral maternity hospital in the central region of Portugal.

Participants: A total of 140 Portuguese women participated in the study.

Measurements: Participants completed the PDPI-R during the second trimester of pregnancy (T1) and at 6 weeks postpartum (T2). At T2, participants also answered the Edinburgh Postnatal Depression Scale (EPDS). During the fourth month postpartum (T3), women were interviewed with the Structured Clinical Interview for DSM-IV Disorders, and between 6 and 9 months postpartum (T4), they completed the EPDS.

Findings: Rates of clinically significant depressive symptoms (EPDS ≥ 10) were 16.4% (23/140) at T2 and 23.2% (23/99) at T4. Six (4.3%) women met the criteria for a clinical diagnosis of PPD (major depressive episode) at T3. Overall, the postnatal version of the PDPI-R performed better than did the prenatal version (average area under the curve = 82% vs. 71%), but both versions accurately predicted women who developed a clinical diagnosis of PPD, at a cut-off score of 4.5 for the prenatal version (sensitivity = 83.3%; specificity = 85.8%) and 9.5 for the postnatal version (sensitivity = 83.3%; specificity = 94.8%).

Key conclusions and implications for practice: Despite the low prevalence of PPD (albeit consistent with prior estimates of major depression at three months postpartum), this clinical condition has very serious consequences for the mother, the baby and the whole

family when present. The PDPI-R is a valid screening tool to estimate the psychosocial risk for developing PPD among Portuguese women and can be used in research (e.g., for cross-cultural comparisons) and clinical practice. The recommended cut-off scores could assist health professionals (namely, midwives) in identifying the women who would benefit from appropriate referrals and/or closer monitoring to prevent them from developing PPD.

Keywords: Postpartum depression, risk factors, screening, Postpartum Depression Predictors Inventory-Revised, predictive validity.

Introduction

Postpartum depression (PPD) is a serious and common problem affecting 13–20% of women worldwide (Gavin et al., 2005; Gaynes et al., 2005). Approximately 20% of Portuguese mothers experience clinically significant depressive symptoms at six–seven weeks postpartum (Alves et al., 2018; Pereira et al., 2017, 2016), and 2.7 to 17% fulfill criteria for a clinical diagnosis of PPD in the first three months after childbirth (Bos et al., 2013; Maia et al., 2011; Pereira et al., 2017). The variety of instruments used, diagnosis criteria, postpartum period under consideration and socioeconomic and health disparities across the studies made difficult to accurately determine the prevalence of PPD (Hahn-Holbrook et al., 2018; Norhayati et al., 2015), including in Portugal (e.g., estimates were lower using DSM- based vs. ICD-10 criteria and when considering point vs. period prevalence). The persistent nature of PPD for a large proportion of mothers (Goodman, 2004), its well-known pervasive impact on the whole family (O'Hara and McCabe, 2013), under-recognition and treatment (Goodman and Tyer-Viola, 2010) and reduced women's help-seeking behaviours for perinatal depressive symptoms (Fonseca et al., 2015) have increased researchers' focus on the primary prevention of PPD.

Along with the screening of current clinical depressive symptoms, assessing women's psychosocial vulnerabilities as part of routine perinatal care has been advised as a good practice point (Austin et al., 2017; Austin and The Marcé Society Position Statement Advisory Committee, 2014). Such complementary assessment should be undertaken prior to and after childbirth (ideally between six and twelve weeks postpartum), offering the prenatal period timely opportunities for health professionals' intervention. Ultimately, conducting a psychosocial assessment allows addressing the priority of early case identification of women at high risk for PPD (Beck, 2002; Beck et al., 2006).

Implicit in this approach is the identification of past and current psychosocial risk factors known to be associated with PPD, a field of research that has received much attention (Beck, 2001; Norhayati et al., 2015; Robertson et al., 2004; Yim et al., 2015) and resulted in the development of several tools aimed to detect women's perinatal mental health risk (Johnson et al., 2012). The Postpartum Depression Predictors Inventory-Revised (PDPI-R; Beck, 2002; Beck et al., 2006) has been increasingly studied across countries (Italy, Korea, Japan, Mexico, Spain and Portugal), which can be justified for

several reasons. First, it is relatively universal, as it covers 13 risk factors for PPD retrieved from an updated meta- analysis including studies from different countries (Beck, 2001). Second, it includes postpartum-related risk factors (e.g., childcare stress) that are left out by most of the current screening tools (Beck, 2002; Beck et al., 2006). Third, it has two available versions (prenatal and postnatal) and corresponding total scores, which allow a quick estimation and update of women's risk throughout the perinatal period. Fourth, its simplicity (yes/no format) and shortness both to complete and interpret facilitates its implementation in overloaded maternity care settings. Fifth, its two-way administration forms (as a self-report measure and as an interview) can be applied according to the services' resources. Finally, it has high acceptability among mothers (Ikeda and Kamibeppu, 2013) and nurses (Hanna et al., 2004), having been recommended for routine use in clinical practice (Hanna et al., 2004; Oppo et al., 2009).

The internationally acceptable psychometric properties of the PDPI-R (Ibarra-Yruegas et al., 2018; Ikeda and Kamibeppu, 2013; Oppo et al., 2009; Rodríguez-Muñoz et al., 2017; Youn and Jeong, 2011) with recommended cut-off scores for the prenatal and postnatal versions, suggest the cross-cultural validity of the inventory. Beyond its clinical relevance, making the PDPI-R available to a wide range of non-English-speaking women could be a way to enhance cross-cultural research in this field. The preliminary psychometric properties of the European Portuguese version of the PDPI-R (postnatal version) have been previously addressed in a cross-sectional survey, and this version has demonstrated its reliability and validity as well as initial predictive capacity (Alves et al., 2018). The present study consists of the next step of the Portuguese validation studies and aimed to (a) explore the capacity of each PDPI-R risk factor assessed prenatally and postnatally in predicting PPD or symptoms thereof and (b) determine the predictive validity of both the pre- and postnatal versions of the PDPI-R in the short and long term.

Methods

Procedure

This study is part of a larger research project focused on dyadic/couple processes relevant to the development of PPD, approved by the institutional Ethics Committees of the Faculty of Psychology and Educational Sciences of the University of Coimbra (Portugal) and one Portuguese university hospital (Centro Hospitalar e Universitário de Coimbra;

CHUC, EPE). Women were recruited at the obstetrics appointments of one Portuguese maternity hospital (Maternity Daniel de Matos; CHUC, EPE) between November 2015 and September 2017 and were eligible if they were (a) in the second trimester of a singleton pregnancy without medical complications with the baby or other adverse clinical events, (b) aged 18 years old or older, (c) in a current romantic relationship (married, cohabitating or dating), and (d) Portuguese-speaking.

Women were asked during an obstetric appointment for permission to be contacted by the researchers. If the women agreed (*N* = 611), they were informed of the purpose of the study, and those who were eligible and willing to participate (*N* = 551) signed an informed consent (keeping a copy for themselves) and were given the questionnaires (T1 – second trimester of pregnancy). At the following obstetric appointment, 335 women returned questionnaires (participation rate: 60.8%). We believe that the 40% of withdrawal may be due to the fact that some women had only one subsequent appointment during pregnancy (and then only one opportunity to deliver the protocol) and sometimes after a long delay (e.g., one month); during this interval of time, women might have lost the protocol and/or the interest to participate in the study. Moreover, no incentives for participation were given, so despite the initial agreement in participating in the study those women may not feel intrinsically motivated to spend the time necessary to participate in the study. Ten women were excluded for ineligibility. At six weeks postpartum (T2), the researchers were not able to contact 14 women due to perinatal loss or lack of information about delivery; they mailed 311 participants the questionnaires along with a prestamped envelope in which to return the questionnaires after completion (148 returned questionnaires; participation rate: 47.6%). During the fourth month postpartum (T3), all the 148 women were contacted by phone by the first author, a trained clinical psychologist with previous experience in clinical practice with the perinatal population, to assess for the presence of a clinical diagnosis of PPD at three months postpartum (*N* = 140 responses), and at the end of the six-month postpartum (T4), 147 women were mailed the EPDS. One hundred and two women returned the questionnaires (participation rate: 69.4%), which were completed between 6 and 7 months postpartum, on average (77.5%; *M* = 6.85, *SD* = 0.88, range = 5.5 – 9.0). Considering that the SCID was the main outcome measure to establish the PDPI-R's predictive validity, the final sample comprised all the women who were interviewed (*N* = 140). Women who dropped out from T1 to T3 (*n* = 171) reported a significantly lower frequency of having

university education, $\chi^2(2) = 9.98$, $p = .007$, $\varphi_c = 0.18$ and were more likely to report a current psychological problem at T1, $\chi^2(1) = 4.05$, $p = .044$, $\varphi_c = 0.11$, than were women who completed the T3 assessment. No differences were found in the remaining sociodemographic, obstetric and clinical variables as well as in prenatal PDPI-R scores.

Measures

Postpartum Depression Predictors Inventory-Revised

The PDPI-R was designed to identify women at high risk for PPD. It consists of two versions: a prenatal version and a postnatal version. The prenatal version was administered during pregnancy (T1) and includes 32 items assessing 10 risk factors: marital status [being single, separated, divorced, or widowed] (1 item), low socioeconomic status (1 item), low self-esteem (3 items), prenatal depression (1 item), prenatal anxiety (1 item), pregnancy intention [unwanted/unplanned] (2 items), history of previous depression (1 item), lack of social support [from partner, family and friends] (12 items), marital dissatisfaction (3 items), and life stress (7 items). With the exception of marital and socioeconomic status, the items are assessed through yes/no questions, and all responses are scored with a "0" (indicating the absence of risk) or "1" (indicating the presence of risk). Social support is assessed by asking women to answer the same four items for three types of relationships (i.e., with their partner, family and friends). The postnatal/full version, administered at T2, includes the same 32 items (10 factors) plus seven additional items specific to the postpartum period that assess three risk factors (total of 39 items assessing 13 risk factors): child care stress (3 items), difficult infant temperament (3 items), and maternity blues (1 item). A total score for each risk factor and version of the PDPI-R can be computed by summing up the items. The total score of the prenatal version varies between 0 and 32, and the total score of the postnatal version varies between 0 and 39. The scoring procedure is available in Beck et al., 2006. Higher scores indicate higher risk for PPD. The European Portuguese postnatal version has shown good reliability (Kuder-Richardson-20 [KR-20] = 0.80), satisfactory construct and convergent validity and initial predictive validity, indicating a cut-off score of 5.5, with acceptable values of sensitivity (76.8%) and specificity (73.0%) (area under the curve [AUC] = .816) (Alves et al., 2018). In the present study, the PDPI-R showed good internal consistency (prenatal version KR-20 = .71; postnatal version KR-20 = .76).

Edinburgh Postnatal Depression Scale

The EPDS (Cox et al., 1987) was used to assess the presence of clinically significant depressive symptoms at T2 and T4. It includes 10 items, answered on a 4-point response scale, with higher scores indicating more depressive symptoms. The Portuguese validation studies recommended a cut-off score of 10 or more as an indicator of a possible depressive disorder (sensitivity = 65%; specificity = 96%; Areias et al., 1996). In this study, Cronbach's alpha was .82 at T2 and .85 at T4.

Structured Clinical Interview for DSM-IV Axis I Disorders, Clinician Version

The SCID-CV (First et al., 1996), a semistructured interview, was used to determine the presence of minor or major depressive episodes (mMD) according to DSM-IV criteria at three months postpartum, the highest point prevalence of postpartum mMD (Gaynes et al., 2005).

Data Analysis

Analyses were conducted using the Statistical Package for Social Sciences (IBM SPSS 23.0). Descriptive statistics were used for sample characterization. Differences in PDPI-R between women experiencing vs. not experiencing clinical depressive symptoms were computed using independent *t*-tests. We analysed the predictive validity of the PDPI-R using two gold standards: a) positive EPDS screen (assessed at T2 and T4) and b) a clinical diagnosis of PPD at T3. For each administration/version of the inventory and gold standard, we assessed the capacity of each risk factor in predicting PPD through univariate binary logistic regressions. We presented the odds ratio (OR) and the confidence intervals (CI) for each risk factor. Risk factors with a p value < 0.10 were included in the multivariate logistic regression analyses (backward stepwise method) to examine the risk factors significantly associated with the presence of PPD ($p < .05$). We conducted receiver operating characteristic (ROC) analyses to determine the sensitivity, specificity, positive predictive value [PPV], and negative predictive value [NPV] associated with different PDPI-R cut-off points. The accuracy of the instrument in discriminating which women would or would not have PPD was obtained by the AUC, which was interpreted as follows (Swets,

1988): low: 0.5-0.7; moderate: 0.7-0.9; and high: 0.9-1. Statistical significance was set at $p < .05$.

Findings

Participants

Women had a mean age of 32.26 years (*SD* = 4.97; range: 20-48), with the majority having a university education (*n* = 98, 70.0%) and being currently employed (*n* = 121, 86.4%). Most women were living with their romantic partners (married/cohabitating: *n* = 133, 95%; relationship length: *M* = 7.72; *SD* = 4.62), living in a rural area (*n* = 72, 51.4%) and expecting their first child (*n* = 88, 62.9%). Only a few women reported pregnancy complications at T1 (*n* = 39, 27.9%), and the majority gave birth vaginally (*n* = 98, 70.0%) without medical complications (*n* = 109, 77.9%; baby's sex: female = 70; male = 70).

Prevalence rates of clinically significant depressive symptoms (EPDS ≥ 10) were 16.4% (23/140) at T2 and 23.2% (23/99) at T4. Six (4.3%) women met the criteria for a clinical diagnosis of PPD (specifically, all women met the criteria for a major depressive episode) at T3.

PDPI-R: Comparison Between Women Experiencing vs. not Experiencing Clinical Depressive Symptoms

We compared the total scores of both PDPI-R versions between women experiencing vs. not experiencing PPD or symptoms thereof at each assessment time point. Women with a positive EPDS screen at T2 (*n* = 23/140; 16.4%) reported higher scores on both the prenatal (4.22 vs. 2.73; $t_{138} = 2.50$, $p = .014$) and postnatal versions (7.65 vs. 3.76; $t_{138} = 5.23$, $p < .001$) compared to women with a negative EPDS screen. Similarly, women with a clinical diagnosis of PPD at T3 (*n* = 6/140; 4.3%) reported higher scores on both versions of the inventory (prenatal version: 6.00 vs. 2.84; $t_{138} = 2.92$, $p = .004$; postnatal version: 11.33 vs. 4.09; $t_{138} = 5.34$, $p < .001$) than did women without a clinical diagnosis of PPD. At T4, there was a trend towards differences between women with a positive (*n* = 23/99; 23.2%) vs. negative EPDS screen for the prenatal version, but this did not reach statistical significance (3.91 vs. 2.76; $t_{97} = 1.98$, $p = .051$); statistically

significant differences were found for the postnatal version (7.13 vs. 3.86; $t_{97} = 4.37$, $p < .001$).

Predictive Value of PDPI-R Risk Factors Assessed Prenatally

Univariate logistic regression was used to analyse the influence of each PDPI-R risk factor assessed at T1 regarding the likelihood of having clinically significant depressive symptoms at T2 and T4 and a clinical diagnosis of PPD at T3 (see Table 1).

Table 1 | Predictive capacity of prenatal PDPI-R risk factors: univariate logistic regression analyses

	Gold standards		
PDPI-R risk factors	**EPDS ≥10 (T2) OR [95% CI]**	**SCID (T3) OR [95% CI]**	**EPDS ≥10 (T4) OR [95% CI]**
Being single	-	-	-
Low socioeconomic status[a]	0.49 [0.06-4.00]	6.94 [1.12-43.17]*	5.12 [1.06-24.87]*
Low self-esteem	2.42 [0.70-8.36]	2.33 [0.42-12.87]	0.77 [0.14-4.26]
Prenatal depression[a]	6.81 [2.11-21.99]**	11.09 [2.00-61.64]**	2.05 [0.54-7.73]
Prenatal anxiety[a]	3.42 [1.19-9.82]*	4.18 [0.48-36.73]	1.52 [0.58-4.00]
Pregnancy intention	2.57 [0.92-7.18]†	[b]	3.00 [0.92-9.81]†
Previous depression[a]	4.24 [1.61-11.13]**	[c]	3.04 [1.15-8.06]*
Lack of social support	1.05 [0.76-1.44]	1.46 [0.96-2.22]†	1.06 [0.75-1.50]
Marital dissatisfaction	1.09 [0.45-2.64]	1.04 [0.20-5.39]	1.45 [0.44-4.77]
Life stress	1.55 [0.93-2.58]†	1.96 [0.83-4.61]	1.51 [0.86-2.62]

Note. T1 = second trimester of pregnancy; T2 = 6-weeks postpartum; T3 = 3/4 months postpartum; T4 = 6/9 months postpartum; PDPI-R = Postpartum Depression Predictors Inventory-Revised; EPDS = Edinburgh Postnatal Depression Scale; SCID = Structured Clinical Interview for DSM-IV Disorders; CI = confidence interval. Dependent variable: 0 = absence of postpartum depression (PPD), 1 = presence of PPD.

[a] Dichotomous predictors were coded as 0 = absence of risk, 1 = presence of risk;

[b] All participants who met criteria for PPD have an intended pregnancy;

[c] All participants who met criteria for PPD had previous depression.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

The multivariate logistic regression analyses indicated that participants experiencing depression during pregnancy (OR = 4.22; 95% CI 1.22-14.58; $p = .023$) and reporting previous depression (OR = 3.19; 95% CI 1.15-8.89; $p = .026$) were significantly

more likely to have clinically significant depressive symptoms at T2 (– 2 Log-Likelihood = 109.97; *Pseudo* R^2 = .10 [Cox and Snell], .17 [Nagelkerke]). The multivariate logistic regression analyses considering PPD at T3 revealed that participants who had prenatal depression were 11 times more likely to have a clinical diagnosis of PPD (OR = 11.09; 95% CI 2.00-61.64; *p* = .006; – 2 Log-Likelihood = 42.85; *Pseudo* R^2 = .05 [Cox and Snell], .16 [Nagelkerke]). Finally, having a low socioeconomic status (OR = 6.25; 95% CI 1.19-32.87; *p* = .030), previous depression (OR = 2.77; 95% CI 1.00-7.67; *p* = .049) and an unintended pregnancy (OR = 3.39; 95% CI 0.97-11.81; *p* = .055) were independently associated with having clinically significant depressive symptoms at T4 (– 2 Log-Likelihood = 94.97; *Pseudo* R^2 = .12 [Cox and Snell], .18 [Nagelkerke]).

Predictive Value of PDPI-R Risk Factors Assessed Postnatally

Table 2 displays the univariate logistic regression analyses of the influence of each PDPI-R risk factor assessed at T2 regarding the likelihood of having clinically significant depressive symptoms at T2 and T4 and a clinical diagnosis of PPD at T3.

The multivariate logistic regression models suggested that mothers experiencing anxiety during pregnancy (OR = 4.17; 95% CI 1.07-16.20; *p* = .039), maternity blues (OR = 4.63; 95% CI 1.10-19.53; *p* = .037), more life stress events (OR = 2.14; 95% CI 1.13-4.05; *p* = .019) and reporting previous depression (OR = 3.81; 95% CI 1.23-11.83; *p* = .020) were significantly more likely to have clinically significant depressive symptoms at T2 (– 2 Log- Likelihood = 82.99; *Pseudo* R^2 = .26 [Cox and Snell], .43 [Nagelkerke]). There was a trend for low self-esteem being associated with the likelihood of having PPD, but this did not reach statistical significance (OR = 6.97; 95% CI 0.92-52.63; *p* = .060). At T3, the multivariate logistic model indicated that participants who perceived a greater lack of social support (OR = 2.33; 95% CI 1.30-4.20; *p* = .005) and life stress events (OR = 2.68; 95% CI 1.08-6.66; *p* = .034) were 2 times more likely to have a clinical diagnosis of PPD (– 2 Log-Likelihood = 28.68; *Pseudo* R^2 = .14 [Cox and Snell], .46 [Nagelkerke]). Finally, having experienced depression (OR = 7.72; 95% CI 1.03-58.05; *p* = .047) and anxiety (OR = 8.58; 95% CI 2.52- 29.21; *p* = .001) during pregnancy was significant and independently associated with having clinically significant depressive symptoms at T4 (– 2 Log-Likelihood = 82.29; *Pseudo* R^2 = .19 [Cox and Snell], .29 [Nagelkerke]).

Table 2 | Predictive capacity of postnatal PDPI-R risk factors assessed at T2: univariate logistic regression analyses

	Gold standards		
PDPI-R risk factors	**EPDS ≥10 (T2) OR [95% CI]**	**SCID (T3) OR [95% CI]**	**EPDS ≥10 (T4) OR [95% CI]**
Being single	-	-	-
Low socioeconomic status[a]	1.14 [0.23-5.67]	6.94 [1.12-43.17]*	2.13 [0.47-9.69]
Low self-esteem	8.42 [0.98-72.63]†	3.91 [1.20-12.75]*	2.28 [0.43-12.06]
Prenatal depression[a]	2.87 [0.66-12.46]	8.86 [1.38-56.92]*	8.00 [1.36-47.17]*
Prenatal anxiety[a]	6.92 [2.39-20.06]***	7.60 [0.86-66.89]†	9.12 [2.80-29.73]***
Pregnancy intention	3.33 [1.22-9.13]*	[b]	3.72 [1.18-11.76]*
Previous depression[a]	4.22 [1.64-10.84]**	[c]	2.50 [0.97-6.47]†
Lack of social support	1.47 [1.12-1.94]**	2.50 [1.51-4.16]***	1.45 [1.07-1.98]*
Marital dissatisfaction	1.48 [0.76-2.89]	1.46 [0.50-4.26]	2.06 [0.96-4.40]†
Life stress	2.43 [1.45-4.09]**	4.21 [1.75-10.12]**	1.71 [1.00-2.94]†
Child care stress	1.40 [0.77-2.56]	1.47 [0.53-4.13]	1.83 [1.00-3.37]†
Infant temperament	1.45 [0.94-2.26]†	2.04 [1.04-4.03]*	1.25 [0.76-2.03]
Maternity blues[a]	5.33 [1.50-18.94]*	3.38 [0.38-29.70]	1.49 [0.55-4.05]

Note. T2 = 6-weeks postpartum; T3 = 3/4 months postpartum; T4 = 6/9 months postpartum; PDPI-R = Postpartum Depression Predictors Inventory-Revised; EPDS = Edinburgh Postnatal Depression Scale; SCID = Structured Clinical Interview for DSM-IV Disorders; CI = confidence interval. Dependent variable: 0 = absence of postpartum depression (PPD), 1 = presence of PPD.

[a] Dichotomous predictors were coded as 0 = absence of risk, 1 = presence of risk;

[b] All participants who met criteria for PPD have an intended pregnancy;

[c] All participants who met criteria for PPD had previous depression.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Predictive Validity of the PDPI-R: Prenatal Version

Table 3 shows the results of the ROC analyses for the prenatal version of the PDPI-R separately for the two gold standards. The ROC analyses suggested that the best relationship between sensitivity and specificity was at a cut-off score of **3.5** when using EPDS cut-off scores as the gold standard and at a cut-off score of **4.5** when considering a clinical diagnosis of PPD (see Figure 1).

Table 3 | Predictive validity of the prenatal version of the PDPI-R: ROC analyses

PDPI-R prenatal version	Cut-off points	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	MR (%)
EPDS ≥ 10	2.5	69.6	53.8	22.9	90.0	43.6
(T2)	**3.5**	**56.5**	**71.8**	**28.3**	**89.4**	**30.7**
AUC .690	4.5	34.8	86.3	33.3	87.1	22.1
(95% CI .580 – .799)						
SCID	2.5	83.3	51.5	7.1	98.6	47.1
(T3)	3.5	83.3	69.4	10.9	98.9	30.0
AUC .803	**4.5**	**83.3**	**85.8**	**20.8**	**99.1**	**14.3**
(95% CI .597 – 1.000)						
EPDS ≥ 10	2.5	60.9	48.7	26.4	80.4	48.5
(T4)	**3.5**	**60.9**	**71.1**	**38.9**	**85.7**	**31.3**
AUC .644	4.5	39.1	88.2	50.0	82.7	23.2
(95% CI .504 – .784)						

Note. Recommended cut-offs are in bold. T2 = 6-weeks postpartum; T3 = 3/4 months postpartum; T4 = 6/9 months postpartum; PDPI-R = Postpartum Depression Predictors Inventory-Revised; ROC = receiver operating characteristic; EPDS = Edinburgh Postnatal Depression Scale; SCID = Structured Clinical Interview for DSM-IV Disorders; AUC = area under the curve; CI = confidence interval; PPV = Positive predictive value; NPV = Negative predictive value; MR = Misclassification rate.

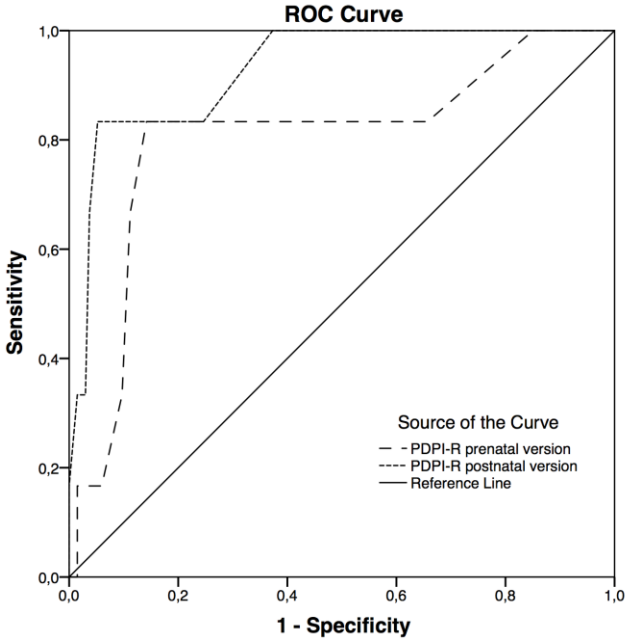

Figure 1 | ROC curve of the prenatal and postnatal versions of the PDPI-R for the detection of postpartum depression (SCID)

Predictive Validity of the PDPI-R: Postnatal Version

The ROC analyses for the postnatal version of the PDPI-R suggested an acceptable balance of sensitivity and specificity for the cut-off scores of 4.5 and 5.5 when using EPDS cut-off scores as the gold standard and for a cut-off score of **9.5** when considering a clinical diagnosis of PPD (see Table 4 and Figure 1).

Table 4 | Predictive validity of the postnatal version of the PDPI-R: ROC analyses

PDPI-R postnatal version	Cut-off points	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	MR (%)
EPDS ≥ 10	3.5	82.6	59.0	28.4	94.5	37.1
(T2)	4.5	78.3	67.5	32.1	94.0	30.7
AUC .790	**5.5**	**65.2**	**80.3**	**39.5**	**92.2**	**22.1**
(95% CI .690 – .890)	6.5	56.5	84.6	41.9	90.8	20.0
	7.5	52.2	88.0	46.2	90.4	17.9
	8.5	43.5	90.6	47.6	89.1	17.1
	9.5	26.1	94.9	50.0	86.7	16.4
SCID	3.5	100	54.5	9.0	100	43.6
(T3)	4.5	100	62.7	10.7	100	35.7
AUC .928	5.5	83.3	75.4	13.2	99.0	24.3
(95% CI .837 – 1.000)	6.5	83.3	80.6	16.1	99.1	19.3
	7.5	83.3	84.3	19.2	99.1	15.7
	8.5	83.3	88.1	23.8	99.2	12.1
	9.5	**83.3**	**94.8**	**41.7**	**99.2**	**5.7**
EPDS ≥ 10	3.5	82.6	57.9	37.3	91.7	36.4
(T4)	**4.5**	**78.3**	**67.1**	**41.9**	**91.1**	**30.3**
AUC .754	5.5	43.5	73.7	33.3	81.2	33.3
(95% CI .652 – .857)	6.5	39.1	81.6	39.1	81.6	28.3
	7.5	30.4	85.5	38.9	80.2	27.3
	8.5	30.4	88.2	43.8	80.7	25.3
	9.5	26.1	96.1	66.7	81.1	20.2

Note. Recommended cut-offs are in bold. T2 = 6-weeks postpartum; T3 = 3/4 months postpartum; T4 = 6/9 months postpartum; PDPI-R = Postpartum Depression Predictors Inventory-Revised; ROC = receiver operating characteristic; EPDS = Edinburgh Postnatal Depression Scale; SCID = Structured Clinical Interview for DSM-IV Disorders; AUC = area under the curve; CI = confidence interval; PPV = Positive predictive value; NPV = Negative predictive value; MR = Misclassification rate.

Discussion

This study prospectively examined the capacity of the PDPI-R in predicting which women are at risk for developing PPD or symptoms thereof in the short and long term. Our findings are congruent with prior research by providing additional support for the risk factors for PPD that are well established internationally (e.g., prenatal and previous depression; Beck, 2001; Norhayati et al., 2015; Robertson et al., 2004). Furthermore, the multivariate models hold relevant implications for defining the ideal time for screening. For instance, women who perceived low social support and more stressful events in the early postpartum were more vulnerable to the development of a PPD diagnosis than were women in similar circumstances during pregnancy. Although these findings are inconsistent with prior research showing that prenatal social support and stressful life events were associated with subsequent PPD or depressive symptoms (Robertson et al., 2004; Yim et al., 2015), the greater impact of such factors in the postpartum period is not surprising attending to the greater changes and demands women face after childbirth. Additionally, prenatal anxiety was only predictive of PPD in the postnatal administration of the PDPI-R, a finding fairly similar to that in the study of Oppo et al. (2009), indicating that anxiety plays an important role in the last phase of pregnancy. Likewise, it seems that prenatal depression is a significant predictor of depression in the long term (at six to nine months postpartum) when present later in pregnancy, which suggests that the presence of depressive symptoms in the last trimester of pregnancy is also worthy of clinical attention (e.g., Marques et al., 2017).

Low socioeconomic status and pregnancy intention (assessed prenatally) were found to increase risk of PPD at six to nine months only. Previous literature has shown inconsistent findings regarding the role of sociodemographic and obstetric factors in the development of PPD (Norhayati et al., 2015). Contrary to the early postpartum period (e.g., Alves et al., 2018), it could be possible that limited financial resources have a greater impact as the child grows due to the increased costs, as it has been suggested in prior studies (e.g., Lara et al., 2016). On a related note, women with an unwanted/unplanned pregnancy are three times more likely to have PPD at the same time (six to nine months after childbirth), perhaps because concerns about finances or other issues associated with having a(nother) child (e.g., incompatibility with career goals) become more evident over the child's first year and beyond. Accordingly, our findings indicated that depressive (and anxiety) symptoms should be repeatedly assessed during pregnancy (covering the third

trimester) as well as during the postpartum period, and the time of risk assessment is an important question to be further considered when delineating prevention strategies.

Regarding the predictive validity of each version of the PDPI-R, overall, the postnatal version performed better than did the prenatal version, detecting an average of 82% vs. 71% of cases with PPD or symptoms thereof. Contrary to the original PDPI-R studies (Beck et al., 2006; Records et al., 2007)—in which the predictive validity of the inventory was considerably superior for the prenatal version—this observation was also salient in previous validation studies (Ikeda and Kamibeppu, 2013; Oppo et al., 2009). Two main reasons can explain these findings. First, three additional (and postpartum-specific) risk factors were included in the postnatal version, even though such risk factors were not found to be significant as individual predictors for PPD (except for maternity blues). Second, the postnatal version was administered closer to the time of PPD assessment, contrary to the long delay of the prenatal version. This is in line with recent studies (e.g., Rados et al., 2016), which demonstrated that PPD prediction was slightly superior when risk factors were assessed after vs. prior to childbirth. This does not mean that women's risk should not be assessed during pregnancy, as the PDPI-R prenatal version was highly sensitive and specific in detecting women with a PPD diagnosis at a cut-off score of 4.5. This value was lower than that of 10.5 shown in Beck et al. (2006) but was in the range between Oppo et al.'s (2009) suggested cut- off of 3.5 and Ikeda and Kamibeppu's (2013) value of 5.5. It is important to underscore, however, that the PDPI-R cut-off scores proposed in the present study not only are based on the ROC analyses but also take into account the study method and sample characteristics, which have important implications for the selection of the most adequate cut-off score, as we discuss below.

The satisfactory predictive values found for the postnatal version are in line with our preliminary analyses of the PDPI-R against an identical gold standard (EPDS ≥ 10 at 1-2 months postpartum) (Alves et al., 2018). Although the ROC analyses suggested an acceptable PDPI-R cut-off score of 4.5 to detect women with clinically significant depressive symptoms at 6 weeks postpartum, several aspects of the present study support our original recommendation of 5.5. First, the current study only considered partnered women (unlike the broad inclusion criteria of the first study), leaving out an important risk factor for PPD (being single). Moreover, the majority of women participated in the study with their partners (because of the dyadic nature of the larger project in which this study takes part), which suggests that these women are likely to have a good relationship with

and receive adequate support from their partners. This could have underestimated the presence of low partner support and/or poor relationship satisfaction, other well-established risk factors for PPD.

Second, due to the longitudinal design of this study, a large proportion of women dropped out of the study (particularly those with less education and experiencing psychological problems during pregnancy) and thus represent a high-risk subgroup of women that was missing in the analyses. Third, the recruitment at only one site vs. the online survey previously conducted (and associated lower sample size and prevalence rates of PPD symptoms) has limited the generalizability of our findings to all Portuguese mothers. Finally, it is noteworthy that the predictive values at a cut-off of 5.5 did not differ meaningfully from those of 4.5, whereby we recommend using a cut-off score of 5.5 in the postnatal version of the PDPI-R to identify the women who would benefit from a subsequent psychological assessment.

We also observed different PDPI-R cut-off scores as a function of the gold standard measure used to establish PPD, particularly salient for the postnatal version, which can be justified by at least two reasons. First, the use of a more or less conservative gold standard could be a reason for the different cut-off scores. Because the EPDS is a screening instrument designed to detect clinically significant depressive symptoms rather than to confirm a diagnosis of PPD, it is expected that the PDPI-R cut-off score was lower when considering this gold standard. However, previous studies that used a diagnostic interview to establish PPD found PDPI-R cut-off scores lower than our recommended value of 9.5 (5.5 and 7.5 in Oppo et al., 2009 and Ikeda and Kamibeppu, 2013, respectively), while those that rely on a self-report measure indicated an identical cut-off score (Youn and Jeong, 2011). Of note, the comparison with previous cut-off scores was a difficult task because of methodological (e.g., PPD assessment timing and measures), cultural (e.g., relevant modifications made over the PDPI-R to best fit cultural contexts; Ikeda and Kamibeppu, 2013; Youn and Jeong, 2011), and sample aspects (i.e., the prevalence of PPD diagnosis in this study was lower than that observed in previous studies). This sample issue constitutes a second possible reason for the different PDPI-R cut-off scores observed in our study. A low proportion of women had a diagnosis of PPD as assessed by the SCID, which may be a methodological limitation. The administration of the interviews by phone (vs. face-to-face) and the dropout of some women at particular risk of suffering from PPD (i.e., those experiencing psychological problems during pregnancy) before the SCID

interviews may have contributed to an underestimation of the rates of PPD. Nevertheless, the percentage of 4.3% of MD found in our study is consistent with the point prevalence of major depression at three months postpartum established in systematic reviews (4.7%; Gaynes et al., 2005) and higher than the findings of a recent Portuguese study (2.7%) with similar methodological procedures (i.e., use of DSM-based diagnosis criteria, equivalent time point assessment, interviews conducted by phone; Pereira et al., 2017). Therefore, our findings could be considered valuable indicators of prevalence estimates of MD at this postpartum time point in Portugal.

Regarding the predictive validity of the PDPI-R in the short and long term, both versions had an overall higher predictive power to estimate the proportion of women who would develop a clinical diagnosis of PPD at three months postpartum than did a positive EPDS screen in either the early or later postpartum period. Interestingly, the capacity of both the PDPI-R versions in detecting "positive cases" is rather comparable in the short and long term with very similar optimal cut-off scores. However, health professionals interested in identifying which women are more likely to develop clinically significant psychological distress in the late (vs. early) postpartum, and thus could benefit from a closer monitoring, should adopt a less conservative cut-off score when administrating the postnatal version of the PDPI-R (i.e., 4.5 instead of 5.5).

Finally, the low PPV (< 50%) and high NPV (> 85%) found might be explained by the low proportion of women with a clinical diagnosis of PPD or symptoms thereof in our study and suggests that the PDPI-R performed better in identifying the women without PPD than in identifying the women with this clinical condition. From a clinical standpoint, this informs us that a positive screen on the PDPI-R is not sufficient to initiate referrals but instead provides feedback to both women and health professionals about women's risk profile and the possible need of further support and/or closer monitoring.

Strengths and Limitations

This study has several strengths, such as its prospective longitudinal design, which allows establishing the temporal relationships between PDPI-R risk factors and PPD. By considering multiple PPD assessment time points, including a standardized psychiatric interview to determine the presence of mMD, and analysing the role of the PDPI-R at two separate time periods (considering individual risk factors and versions' total scores), this

study contributes to the existing knowledge on this field. Its limitations include participants' recruitment method (women were recruited at only one public maternity hospital in the central region of Portugal) and the restrictive inclusion criteria to be in a romantic relationship, which precludes the assessment of one of the PDPI-R risk factors. The high proportion of dropouts in this study may possibly be due to the lack of financial compensation for participation and follow-up assessment undertaken by post. In addition, the selective attrition may reflect the cognitive burden associated with the completion of self-report questionnaires by participants with mental health problems and lower education. Taken these factors together, these aspects restrict the generalizability of the findings, and the selected cut-off scores should be used with caution. Future studies should consider using incentives for participation, in order to achieve a more heterogeneous sample and enhance participants' retention over the perinatal period.

Implications for Practice and Future Research

Relevant implications for midwifery care could be derived from the findings of this study. They encourage the administration of the PDPI-R as a first step in a triage for identifying beforehand the women at high risk for experiencing PPD. The prenatal version might be useful for health professionals who have frequent contact with women during pregnancy, such as midwifes and nurses, and the postnatal version could be timely completed at the routine 6-week postpartum appointment (as it is established in many settings worldwide). The later should be administered even among women at low-risk prenatally. Combined with a depression screening tool (e.g., EPDS), this procedure could be integrated into routine antenatal and postnatal care and assist health professionals' decision-making of adequate management; this implication is encouraging, as psychosocial services are available to women followed in obstetric departments in many countries. For instance, in Portugal, psychosocial services (e.g., mental health care, social services) are freely available in major Public Maternity Hospitals and General Hospitals as well as in some Primary Care Services, in which women are routinely followed by obstetrician or family doctors during the perinatal period (Fonseca and Canavarro, 2017). Replicating this study at the national level and assessing the acceptability of the inventory (to Portuguese health professionals and women) and its suitability as a component of a stepped care model approach constitute important directions for future research before making solid recommendations for changes in clinical practice.

Specifically concerning the screening for depression, our findings add support to previous recommendations (Austin et al., 2017) in two ways. First, by suggesting that at least two antenatal screenings for depressive and anxiety symptoms should be conducted (e.g., during the first/second obstetric appointment and the third trimester of pregnancy). Second, by suggesting follow-up postpartum screenings for depression, which may be combined with routine well-baby visits and undertaken by pediatric nurse practitioners or pediatricians, as this is the most consistent health care contact that women maintain after the obstetric follow-up visit. PPD screening in pediatric settings is recommended by the American Academy of Pediatrics (Earls and The Committee on Psychosocial Aspects of Child and Family Health, 2010) and has been shown to be reliable and feasible (Liberto, 2012). The findings of this study did not allow us to draw conclusive recommendations about the ideal frequency of screening (as the T4 assessment included women between six and nine months postpartum) but we could assume that one assessment should be undertaken approximately at six months postpartum (as suggested by prior research; e.g., Yawn et al., 2015) and repeated as clinically indicated.

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Empirical study III

Dyadic coping and dyadic adjustment in couples with women with high depressive symptoms during pregnancy

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Dyadic coping and dyadic adjustment in couples with women with high depressive symptoms during pregnancy

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Abstract

Objective: The present study aimed to compare dyadic coping (DC) and dyadic adjustment in couples in which the woman was experiencing high levels of depressive symptoms and in couples in which the woman presented minimal or no depressive symptoms.

Background: Pregnancy may be considered a situation of dyadic stress, during which the presence of high levels of depressive symptoms may impair the ways couples cope together with stress; however, this topic has not yet been studied.

Methods: Pregnant women and their partners (*n* = 289 couples) completed the Edinburgh Postnatal Depression Scale, the Dyadic Coping Inventory, and the Revised Dyadic Adjustment Scale during the second trimester of pregnancy.

Results: Couples in which the woman was experiencing high levels of depressive symptoms (*n* = 57) reported less DC enacted by oneself and by the partner (particularly, less supportive and more negative DC), common DC and overall dyadic adjustment, compared to couples in which the woman was not experiencing high levels of depressive symptoms (*n* = 232).

Conclusion: These findings highlight the need to assess couples' dyadic adjustment and DC strategies, which is particularly important when women screened positive for high levels of depressive symptoms during pregnancy.

Keywords: pregnancy; couples; depressive symptoms; dyadic coping; dyadic adjustment.

Introduction

Although pregnancy is a normative event in couples' lives, this period can be perceived as highly stressful not only for each partner individually but also for the couple as a unit, and therefore can be conceptualized as a context of dyadic stress (Bodenmann, 2005). During this period, couples need to manage considerable individual and interpersonal changes within and outside the couple's relationship (Canavarro, 2001; Cowan & Cowan, 2000), which are likely to activate partner-oriented behaviours to support the other when one partner communicates stress (e.g., by showing empathy and understanding when one discloses worries about future parenting responsibilities) and couple-oriented behaviours when facing a shared stressor (e.g., by sharing expectations and working together to manage house-related tasks). This process is designated dyadic coping (DC), a concept that was developed in the context of the Systemic Transactional Model (STM; Bodenmann, 2005).

According to the STM, once stress is communicated by one partner and perceived and decoded by the other partner, couples may engage in different forms of DC, which are commonly grouped into positive and negative strategies (Bodenmann, 2005). Types of positive DC behaviours include emotion and problem-oriented supportive (one partner assisting the other in dealing with his or her stressor, e.g., helping with daily tasks, providing advice, helping reframe the situation, and expressing empathic understanding and solidarity) and common DC (both partners engaging in mutual attempts to manage a shared stressor jointly, e.g., joint problem solving, joint information seeking, sharing of feelings, and mutual commitment), and delegated DC (one partner taking over responsibilities at the request of the other partner to alleviate his or her stress). Negative forms of DC include hostile (e.g., when one partner provides support minimizing the other's stress or using sarcasm or open disinterest), ambivalent (e.g., when one partner provides support unwillingly and without interest), and superficial behaviours (e.g., when one partner provides support without empathy). DC has been shown to be effective in moderating the impact of stress in couples' individual and relational well-being (Kuhn, Hilpert, & Bodenmann, 2016).

During the perinatal period, the protective role of supportive dynamics within couples has been widely studied, particularly after childbirth. Although male partners have their own needs of support during pregnancy (Kowlessar, Fox, & Wittkowski, 2015),

pregnant women are traditionally viewed as the care recipients and their partners as the support-providers (O'Leary & Thorwick, 2006). Accordingly, the impact of (perceived) male partner's support in improving women's perinatal emotional health has received great attention (Pilkington, Milne, Cairns, Lewis, & Whelan, 2015). However, relevant components of the STM remain to be explored. First, it remains to be explored the forms by which each partner expresses their needs and requests for support, which is a trigger for subsequent DC responses. Second, considering the shared and interdependent experience of expecting/having a baby within couples, joint coping efforts (beyond asymmetric supportive roles) are expected to occur and, thus, require further attention.

The occurrence of high levels of depressive symptoms in women during pregnancy is common (e.g., Escribà-Aguir, Gonzalez-Galarzo, Barona-Vilar, & Artazcoz, 2008; Figueiredo & Conde, 2011), may negatively affect positive dimensions of the couple's relationship (e.g., affection, closeness, joint activities; Figueiredo et al., 2010), and together with pregnancy-related demands and other caregiving and work-related commitments, may consequently constrain couples' engagement in DC. On the one hand, partners must cope with women's depressive symptoms. Studies addressing the effects of women's postpartum depressive symptoms on their partners suggest that the partners experience increased emotional burden, difficulties in communicating and supporting each other within the couple relationship and a lack of appreciation of coping efforts (Westall & Liamputtong, 2011). When dealing with women's prenatal depressive symptoms, male partners can either engage in supportive behaviours, namely when they are perceptive of the women's needs, but also in negative behaviours such as instigating conflicts (Blanchard, Hodgson, Gunn, Jesse, & White, 2009). Evidence indicated that men whose pregnant spouses were experiencing high levels of depressive symptoms also reported more anxiety and depressive symptoms themselves (Field et al., 2006).

On the other hand, this additional stressor may undermine dyadic efforts to cope with the pregnancy-related demands. In studies in the general population, evidence showed that couples in which one partner is a depressed woman often present a lack of resources needed to successfully manage stress and solve problems, by displaying high negativity such as criticism and withdrawal, and low positivity such as less expression of affection (e.g., Bodenmann et al., 2008; Coyne, Thompson, & Palmer, 2002; Davila, Stroud, & Starr, 2009). Women with high depressive symptoms experience more difficulties in communicating their own stress and simultaneously in engaging in adaptive DC behaviours

toward their partners (Bodenmann, Charvoz, Widmer, & Bradbury, 2004), who in turn display more destructive coping with conflict and less expression of affection (Coyne et al., 2002). A recent study with couples in which one of the partner had depression showed that DC was closely linked to relationship quality (Gabriel, Bodenmann, & Beach, 2016). Accordingly, because dyads in which women present high levels of depressive symptoms are more likely to experience poor dyadic adjustment (Figueiredo et al., 2010), it would be expected that they would experience more challenges in dealing with the substantial tasks of this period than couples in which women present low levels of depressive symptoms. Particularly, women with high levels of depressive symptoms would likely to be less able to signal (and communicate) their needs for support, and consequently to have their needs met. This remains unexplored.

The main aim of this study was to compare the forms of DC and dyadic adjustment during pregnancy in couples in which the woman presents high levels of depressive symptoms and in couples in which the woman presents minimal or no depressive symptoms. We also examined the DC process (i.e., the associations between one's own stress communication and their partners' DC responses), separately in both groups of couples, and explored group differences/similarities. Our hypotheses were that couples in which the woman presents high levels of depressive symptoms would present less effective stress communication (hypothesis 1), less supportive and common DC and more negative DC (hypothesis 2) as well as less dyadic adjustment (hypothesis 3) than couples in which the woman presents minimal or no depressive symptoms. Because the present study is one of the first that examines DC strategies in the context of depressive symptoms during pregnancy, we adopt an exploratory approach concerning specific DC subscales (emotion- and problem-oriented DC and delegated DC). Additionally, we hypothesised that the associations between one's own stress communication and their partners' DC responses would be weaker in couples in which women present high levels of depressive symptoms, in comparison with couples in which women present minimal or no depressive symptoms (hypothesis 4).

Method

Participants and procedures

This study was approved by the Research Ethics Committees of the Faculty of Psychology and Educational Sciences, University of Coimbra and of one university hospital (Centro Hospitalar e Universitário de Coimbra; CHUC). Inclusion criteria of the study were as follows: (1) women in the second trimester of a singleton pregnancy without any complications with the baby (e.g., foetal anomalies or other medical problems) or other adverse clinical events, (2) both partners are in a relationship (formally married, cohabiting or dating), (3) both partners are at least 18 years old, and (4) both partners are able to read and understand the Portuguese language to complete the set of questionnaires.

The data collection occurred between November 2015 and November 2016 in the Maternity Daniel de Matos of the CHUC. Eligible women (and their partners, when applicable) were first informed about the general aim of the study by their obstetrician. Those who agreed to be contacted by the researchers were presented detailed information about the study (specific aims and instructions, confidentiality considerations). Participants who decided to participate signed a consent form (a copy of which was given to all participants) and were given the questionnaires in a sealed- envelope. They were asked to complete them independently at home without collaboration and to return them at the next obstetric appointment.

The researchers initially contacted 611 women/couples, of which 52 refused to participate (due to lack of time or interest in the study). A total of 551 women/couples accepted to participate in the study, of which 335 returned the set of questionnaires (participation rate: 60.8%); 25 questionnaires were excluded from the analyses because they were completed only by the woman. Of the remaining 310 couples, seven couples were excluded because they did not meet the inclusion criteria. Following Peng, Harwell, Liou, and Ehman (2006) recommendations, 14 couples were further excluded because more than 20% of responses were missing in at least one of the relevant scales/subscales used in this study. The final sample consisted of 289 heterosexual couples: 57 (19.7%) couples in which the woman had high levels of depressive symptoms (designated as *couples with a woman with a positive EPDS screen*) and 232 (80.3%) couples in which the woman had

minimal or no depressive symptoms (designated as *couples with a woman with a negative EPDS screen*).

The socio-demographic and clinical characteristics of the sample are presented in Table 1. Women and men in couples with a woman with a positive EPDS screen had previously experienced more often psychological problems and received psychological treatment than those in couples with a woman with a negative EPDS screen. Men in couples with a woman with a positive EPDS screen also reported high levels of depressive symptoms with more frequency and women were more likely to report pregnancy complications.

Table 1 | Sociodemographic and clinical characteristics of the sample (*N* = 289 couples)

	Couples with a woman with a negative EPDS screen (*n* = 232)		Couples with a woman with a positive EPDS screen (*n* = 57)		Group differences			
	Women	**Men**	**Women**	**Men**	**Women**		**Men**	
					t / χ^2	d^a / φ_c	t / χ^2	d / φ_c
Age (years), *M* (*SD*)	31.55 (4.50)	33.65 (5.03)	31.86 (5.15)	33.52 (5.42)	0.45	0.06	-0.18	0.02
Educational level, *n* (%)								
Middle school	11 (4.8)	52 (22.7)	5 (9.1)	19 (33.3)	1.73	0.08	2.80	0.10
High school	77 (33.3)	76 (33.2)	16 (29.1)	17 (29.8)				
University	143 (61.9)	101 (44.1)	34 (61.8)	21 (36.8)				
Professional status, *n* (%)								
Employed	194 (84.7)	217 (94.3)	46 (80.7)	50 (89.3)	0.55	0.04	1.86	0.08
Unemployed/Other[b]	35 (15.3)	13 (5.7)	11 (19.3)	6 (10.7)				
Psychopathology history, *n* (%)								
Psychological problems (yes)	66 (28.8)	9 (4.0)	33 (58.9)	7 (13.0)	17.99***	0.25	6.58*	0.15
Psychological treatment (yes)	51 (22.3)	17 (7.5)	27 (50.0)	9 (16.1)	16.83***	0.24	3.97*	0.12
EPDS ≥10, *n* (%)	0 (0.0)	18 (7.8)	57 (100)	22 (38.6)			36.49***	0.36
					t / χ^2		d / φ_c	
Relationship status, *n* (%)								
Married	143 (61.6)		35 (61.4)		1.13		0.06	
Cohabitating	83 (35.8)		19 (33.3)					
Dating	6 (2.6)		3 (5.3)					

Relationship length (years), *M* (*SD*)	7.18 (4.49)	7.02 (4.43)	-0.24	0.04
Prior children (yes), *n (%)*	85 (36.8)	25 (43.9)	0.97	0.06
Obstetric history, *n (%)*				
Pregnancy loss history (yes)	41 (18.6)	12 (21.8)	0.30	0.03
Infertility history (yes)	21 (9.7)	9 (16.7)	2.11	0.09
Current pregnancy, *n* (%)				
Desired pregnancy (yes)	226 (98.7)	54 (94.7)	3.47	0.11
Pregnancy complications (yes)	70 (30.4)	27 (47.4)	5.85*	0.14
Gestational weeks, *M* (*SD*)	22.66 (5.26)	23.68 (5.24)	1.31	0.19

[a] Effect-size interpretation (Cohen, 1992): small: $d \geq .20$, $\varphi_c \geq .01$; medium: $d \geq .50$, $\varphi_c \geq .03$; large: $d \geq .80$, $\varphi_c \geq .05$.

[b] Professional status was coded as employed and unemployed/other because the other category only contained 3 participants (2 students and 1 retired).

* $p < .05$; *** $p < .001$

Measures

Socio-demographic and clinical characteristics

Socio-demographic data and psychopathology history were obtained by self-report from both partners. Psychopathology history was assessed with the yes/no questions "Did you ever had psychological/psychiatric problems, for example, depression, anxiety?" and "Did you ever had psychological/psychiatric treatment?". Women also provided data concerning their obstetric history and current pregnancy through yes/no questions (e.g., "Until now, did you experience any complications during pregnancy, for example, infections, gestational diabetes, arterial hypertension, or problems with the placenta?").

Depressive symptoms

The Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987), a 10-item self-reporting inventory of depressive symptoms, was used to assess high levels of prenatal depressive symptoms. Each item was answered on a 4-point response scale, with higher scores reflecting more depressive symptoms. Although originally developed to detect postpartum depression, the EPDS has been considered valid to screen depressive symptoms during pregnancy (Kozinszky & Dudas, 2015), including in Portugal (e.g., Figueiredo & Conde, 2011; Fonseca & Canavarro, 2017). The Portuguese validation studies suggest a cut-off score of 10, with reasonable values of sensitivity (65) and specificity (96) (Areias, Kumar, Barros, & Figueiredo, 1996). Based on this cut-off score, we divided the sample into couples with a woman with a positive EPDS screen (woman's EPDS ≥10) or with a woman with a negative EPDS screen (woman's EPDS <10). In this study, Cronbach's α ranged from .65 (women, couples with a woman with a negative EPDS screen) to .82 (men, couples with a woman with a negative EPDS screen).

Dyadic coping

DC was assessed using the Dyadic Coping Inventory (DCI; Bodenmann, 2008; PV: Vedes, Nussbeck, Bodenmann, Lind, & Ferreira, 2013). This inventory consists of 37 items answered on a 5-point response scale (1 = *very rarely* to 5 = *very often*). The DCI assesses different components of the STM, including subscales for stress communication (4 items), partner-oriented behaviours such as emotion (3 items) and problem-focused (2 items) supportive DC, delegated DC (2 items) and negative DC (4 items) as well as couple-oriented behaviours such as emotion (2 items) and problem- focused (3 items) common

DC. Except for common DC subscales, two item-parallel versions exist for each subscale: respondents rate one's own stress communication and coping efforts to help the partner when he/she communicates stress (subscales of DC enacted by oneself) and their partners' stress communication and coping efforts when one communicates stress (subscales of DC enacted by the partner). Different total scores can be separately calculated: total scores for each of these specific subscales (by computing the mean of the items on the subscale), with higher scores denoting more of the behaviour of interest; and, composite scores that included all the subscales enacted by oneself (composite score of DC by oneself; 15 items) and all the subscales enacted by the partner (composite score of DC by the partner; 15 items). The composite scores were obtained by computing the mean of all the items of the respective subscales (items from negative DC subscale were reverse coded), with higher scores reflecting more perceived DC in oneself and in the partner, respectively. In this study, we used both individual subscales scores and composite scores. In our sample, Cronbach's α ranged from .78 (DC by oneself – men, couples with a woman with a positive EPDS screen) to .91 (common DC – women, couples with a woman with a positive EPDS screen).

Dyadic adjustment

The Revised Dyadic Adjustment Scale (RDAS; Busby, Christensen, Crane, & Larson, 1995; PV: Pereira, Moura-Ramos, Narciso, & Canavarro, 2017) was used to assess relationship satisfaction (4 items), cohesion (4 items) and consensus (6 items). The 14 items are rated on a 6-point response scale (e.g., 0 = *always disagree* to 5 = *always agree*) or a 5-point response scale (e.g., 0 = *never* to 4 = *every day*), with higher scores indicating more relationship quality. Cronbach's α for this sample ranged between .66 (Satisfaction – men, couples with a woman with a negative EPDS screen) and .89 (Total score – women, couples with a woman with a positive EPDS screen).

Data analysis

Data were analysed using the Statistical Package for Social Sciences (IBM SPSS 23.0). After excluding couples with missing responses to more than 20% of the items for each scale/subscale used in this study, observations with 20% or less of missing values and completely at random were managed by person mean substitution (i.e., missing values on an item were replaced with the mean of all of a given individual's completed items in the

scale/subscale). This method has been considered adequate for handling a proportion of missing data of 20% or less on Likert scales (Downey & King, 1998). Socio-demographic, clinical and obstetric variables were not imputed. Chi-square tests and independent *t*-tests were conducted to assess socio-demographic and clinical differences between groups. To account for the interdependency of a couple's observations and to allow the investigation of gender differences within the couple, we conducted repeated-measures multivariate analysis of covariance (MANCOVA) on the couple as a unit (i.e., the database was restructured to consider each couple as the subject of the analysis and each partner's score as a different variable). Group (couples with a woman with a positive vs. negative EPDS screen) was considered the between-subjects factor and gender (women vs. men) the within-subjects factor. Significant differences on socio-demographic and obstetric characteristics between groups were included as covariates, but psychological variables were not controlled for because these differences were expected. Univariate tests were performed when the multivariate effects were significant. To examine the associations between one's own stress communication (stress communication enacted by oneself) and their partner's DC responses (emotion- and problem-oriented supportive DC, delegated DC, negative DC and emotion- and problem-oriented common DC), we conducted Pearson's correlations between the dyad members' scores, separately for both groups of couples. The Pearson's correlations between groups were compared using Z tests. The statistical significance was set at $p < .05$. Post hoc power calculations (G*Power; Faul, Erdfelder, Lang, & Buchner, 2007) for the comparison analyses, with a significance level of .05 and power ≥ .80 ensured that medium to large effects could be detected.

Results

Dyadic Coping in Couples with a Woman with a Negative versus Positive EPDS Screen

Regarding the composite scores and common DC, a significant multivariate group effect was found. Univariate tests showed that couples with a woman with a positive EPDS screen presented lower levels of DC by oneself, by the partner, and common DC compared with couples with a woman with a negative EPDS screen (see Table 2). The multivariate effect of gender was also significant, with women reporting higher scores than men in DC by oneself. The interaction group x gender was not significant.

When examining the specific forms of DC, we found a significant multivariate group effect, with couples with a woman with a positive EPDS screen presenting significantly lower scores in emotion and problem-oriented supportive DC by oneself and common DC, emotion-oriented supportive and delegated DC by partner, and higher scores in negative DC as enacted by oneself and by the partner than couples with a woman with a negative EPDS screen (see Table 2). The multivariate effect of gender was also significant, with women reporting higher scores of stress communication enacted by oneself, lower scores of stress communication enacted by the partner, and higher delegated and negative DC enacted by the partner than men. No significant interaction between group and gender was found.

Table 2 | Dimensions of dyadic coping and dyadic adjustment: Descriptive statistics, main and interaction effects of group and gender (*N* = 287 couples)

	Couples with a woman with a negative EPDS screen (*n* = 230)[a]		Couples with a woman with a positive EPDS screen (*n* = 57)		Group		Gender		Group X Gender	
	Women *M* (*SD*)	Men *M* (*SD*)	Women *M* (*SD*)	Men *M* (*SD*)	*F*	η_p^2	*F*	η_p^2	*F*	η_p^2
Dyadic coping (composite scores)					*V* = .05, $F_{(3, 282)}$ = 5.41**, η_p^2 = .05[b]		*V* = .09, $F_{(3, 282)}$ = 8.88***, η_p^2 = .09		*V* = .01, $F_{(3, 282)}$ = 0.74, η_p^2 = .01	
DC (O)	4.15 (0.43)	3.97 (0.47)	3.90 (0.47)	3.79 (0.41)	15.56***	.05	14.57***	.05		
DC (P)	4.00 (0.52)	4.00 (0.51)	3.70 (0.64)	3.80 (0.51)	14.57***	.05	1.06	.00		
CDC	4.02 (0.71)	3.95 (0.69)	3.67 (0.85)	3.73 (0.69)	8.99**	.03	0.10	.00		
Dyadic coping (specific subscales)					*V* = .14, $F_{(12, 273)}$ = 3.79***, η_p^2 = .14		*V* = .19, $F_{(12, 273)}$ = 5.40***, η_p^2 = .19		*V* = .05, $F_{(12, 273)}$ = 1.07, η_p^2 = .05	
SC (O)	4.05 (0.60)	3.61 (0.65)	3.90 (0.61)	3.51 (0.69)	3.20	.01	44.17***	.14		
SC (P)	3.66 (0.74)	3.77 (0.63)	3.42 (0.93)	3.76 (0.60)	2.42	.01	6.43*	.02		
Emotion-SDC (O)	4.25 (0.55)	4.11 (0.61)	3.93 (0.67)	3.91 (0.54)	14.06***	.05	1.95	.01		
Emotion-SDC (P)	4.24 (0.66)	4.23 (0.64)	3.94 (0.77)	3.81 (0.80)	19.40***	.06	1.30	.01		
Problem-SDC (O)	3.92 (0.69)	3.89 (0.68)	3.63 (0.73)	3.61 (0.61)	12.44***	.04	0.42	.00		
Problem-SDC (P)	3.92 (0.79)	3.84 (0.79)	3.82 (0.83)	3.81 (0.74)	0.66	.00	0.74	.00		
DDC (O)	3.77 (0.77)	3.80 (0.69)	3.61 (0.84)	3.71 (0.68)	2.01	.01	1.46	.01		
DDC (P)	3.95 (0.80)	3.70 (0.78)	3.75 (0.73)	3.50 (0.73)	4.41*	.02	5.02*	.02		
NDC (O)	1.53 (0.55)	1.67 (0.64)	1.84 (0.58)	1.91 (0.69)	16.48***	.06	2.13	.01		

NDC (P)	1.77 (0.65)	1.71 (0.65)	2.27 (0.79)	2.01 (0.76)	26.25***	.09	5.98*	.02	
Emotion-CDC	3.67 (0.97)	3.65 (0.95)	3.31 (0.95)	3.44 (0.90)	5.07*	.02	0.11	.00	
Problem-CDC	4.25 (0.68)	4.14 (0.65)	3.91 (0.89)	3.92 (0.71)	10.16**	.04	0.71	.00	
Dyadic adjustment					V = .11, $F_{(3, 282)}$ = 12.04***, η_p^2 = .11		V = .01, $F_{(3, 282)}$ = 0.96, η_p^2 = .01		V = .00, $F_{(3, 282)}$ = 0.22, η_p^2 = .00
Satisfaction	4.28 (0.41)	4.27 (0.46)	3.87 (0.69)	3.93 (0.67)	36.00***	.11			
Cohesion	3.47 (1.00)	3.34 (0.99)	3.21 (1.01)	3.11 (0.92)	5.06*	.02			
Consensus	4.21 (0.56)	4.16 (0.51)	4.00 (0.55)	3.98 (0.65)	6.24*	.02			
Total score	56.10 (7.13)	55.21 (7.02)	52.30 (8.74)	51.93 (8.17)	14.04***	.05			

Note. V is the value of Pillai's Trace. Univariate tests were presented when the multivariate effects were significant. DC = dyadic coping; O = by oneself; P = by the partner; CDC = common DC; SC = stress communication; Emotion-SDC = Emotion-oriented supportive DC; Problem-SDC = Problem-oriented supportive DC; DDC = delegated DC; NDC = negative DC; Emotion-CDC = Emotion-oriented CDC; Problem-CDC = Problem-oriented CDC.

[a] The Ns of couples do not add up to 232 due to missing values on the covariate included (pregnancy complications).

[b] Effect-size interpretation (Cohen, 1992): small: $\eta_p^2 \geq .01$; medium: $\eta_p^2 \geq .06$; large: $\eta_p^2 \geq .14$).

* $p < .05$; ** $p < .01$; *** $p < .001$

We conducted exploratory analyses to compare the two subgroups of couples with a woman with a positive EPDS screen (see Figure 1): couples in which both partners were experiencing high levels of depressive symptoms (n = 22) reported lower levels of emotion-oriented supportive DC by oneself ($F_{(1,55)}$ = 15.25, p < .001, η_p^2 = .22), emotion ($F_{(1,55)}$ = 12.44, p < .01, η_p^2 = .18) and problem-oriented ($F_{(1,55)}$ = 12.24, p < .01, η_p^2 = .18) supportive DC by the partner, delegated DC by the partner ($F_{(1,55)}$ = 4.38, p < .05, η_p^2 = .07) and emotion ($F_{(1,55)}$ = 14.38, p < .001, η_p^2 = .21) and problem-oriented ($F_{(1,55)}$ = 7.62, p < .01, η_p^2 = .12) common DC in comparison with couples in which only the woman scored above the cut-off on the EPDS (n = 35).

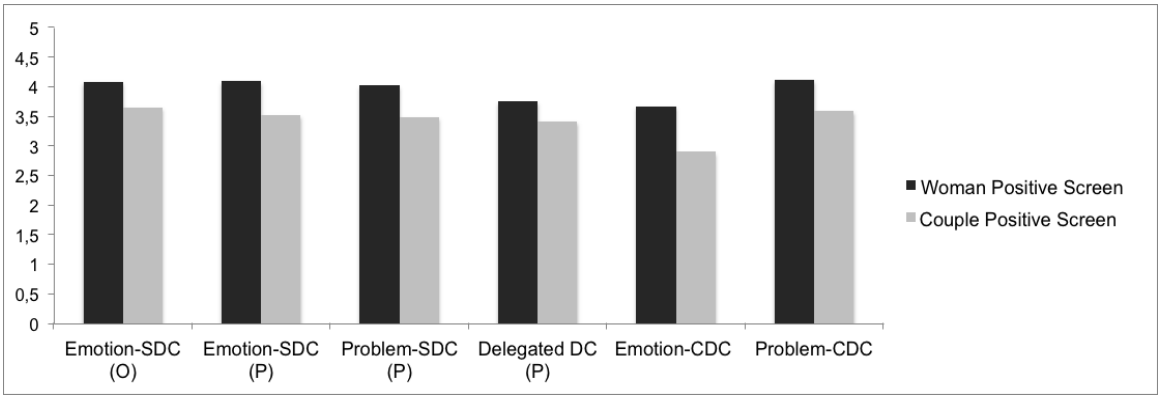

Figure 1 | Mean scores of emotion-oriented supportive dyadic coping (DC) by oneself, emotion-oriented supportive DC by partner, problem-oriented supportive DC by partner, delegated DC by partner, emotion-oriented common DC and problem-oriented common DC, by group (*woman positive screen, n* = 35: only the woman was experiencing high levels of depressive symptoms vs. *couple positive screen, n* = 22: both partners were experiencing high levels of depressive symptoms)

Dyadic Adjustment in Couples with a Woman with a Negative versus Positive EPDS Screen

Regarding dyadic adjustment, the multivariate effect of group was significant, with couples with a woman with a positive EPDS screen presenting lower scores in all dimensions than couples with a woman with a negative EPDS screen (see Table 2). Additionally, couples in which both partners were experiencing high levels of depressive symptoms (n = 22) reported lower levels of satisfaction ($F_{(1,55)}$ = 10.91, p < .01, η_p^2 = .17), consensus ($F_{(1,55)}$ = 6.67, p < .05, η_p^2 = .11) and cohesion ($F_{(1,55)}$ = 4.25, p < .05, η_p^2 = .07) in comparison with couples in which only the woman scored above the cut-off on the EPDS (n = 35).

Dyadic Coping Process in Couples with a Woman with a Negative versus Positive EPDS Screen

For couples with a woman with a negative EPDS screen, higher scores on women and men's stress communication were significantly associated with their partner's higher engagement in problem-oriented supportive behaviours and lower engagement in negative behaviours (see Table 3). The correlations were not significantly different between the two groups of couples. Higher scores on men's stress communication were significant and positively associated with women's higher engagement in emotion- and problem-oriented common DC in both groups of couples.

Table 3 | DC process within couples, by group (*N* = 289 couples)

	Couples with a woman with a negative EPDS screen (*n* = 232)	Couples with a woman with a positive EPDS screen (*n* = 57)	Group differences
	r[a]	*r*	*Z*-test
Women's SC (O)			
Men's Emotion-SDC (O)	.12	.07	0.33
Men's Problem-SDC (O)	.16*	.01	1.00
Men's DDC (O)	.10	-.01	0.73
Men's NDC (O)	-.14*	-.21	0.48
Men's Emotion-CDC	.11	.18	-0.47
Men's Problem-CDC	.17**	.20	-0.21
Men's SC (O)			
Women's Emotion-SDC (O)	.17**	.10	0.47
Women's Problem-SDC (O)	.15*	.24	-0.62
Women's DDC (O)	.09	.22	-0.88
Women's NDC (O)	-.16*	-.14	-0.14
Women's Emotion-CDC	.23***	.28*	-0.35
Women's Problem-CDC	.20**	.35**	-1.08

Note. DC = dyadic coping; SC = stress communication; O = by oneself; Emotion-SDC = Emotion-oriented supportive DC; Problem-SDC = Problem-oriented supportive DC; DDC = delegated DC; NDC = negative DC; Emotion-CDC = Emotion-oriented common DC; Problem-CDC = Problem-oriented common DC.

[a]Effect-size interpretation (Cohen, 1992): small: $r \geq .10$; medium: $r \geq .30$; large: $r \geq .50$.

* $p < .05$; ** $p < .01$; *** $p < .001$

Discussion

This study highlights several innovative main findings. First, our findings suggest that both groups of couples tend to communicate their stress in similar ways. Contrary to our first hypothesis, this finding was unexpected, considering previous results indicating that women with high levels of depressive symptoms communicate their stress less often to their partner than women without depressive symptoms (Bodenmann et al., 2004). Existing research on help-seeking for mental health problems during the perinatal period could help us to better understand these findings. Women with perinatal depressive or anxiety symptoms tend to discuss their emotional experiences with their family and their partners often express concerns about their depressed/anxious mood (Henshaw, Sabourin, & Warning, 2013). Likewise, these women may feel comfortable disclosing their stress to obtain support or help. Another possible explanation is that since these couples perceived poor quality in their romantic relationship, it is plausible that the discussion about marital-related difficulties and expression of stress takes a central role in the couple's communication; accordingly, the nature and content of the stress experienced between the two groups of couples might be different, while the process to disclose it being similar to some degree.

Second, these findings do not mean that couples in which women present high levels of depressive symptoms are necessarily able to manage their stress together. Indeed, consistent with our second hypothesis, supportive partner and couple-oriented efforts of coping appear to be reduced (both emotion- and problem-oriented), with these couples engaging in more negative attempts to help partners coping with stress. Findings from previous studies in the context of general depression, which support the low positivity and high negativity of couples with a depressed woman during problem-solving interactions (e.g., Bodenmann et al., 2008; Coyne et al., 2002; Davila et al., 2009), are relevant to better understanding our findings. As expected, those couples also experience poor relational adjustment, which supported our third hypothesis and expands prior research (Figueiredo et al., 2010). This may lead to an inevitable reduction of opportunities for engaging in DC. This idea is supported by the closer links between marital adjustment and DC (Kuhn et al., 2016) and, specifically, by the fact that couples with a depressed partner reported less adaptive DC namely when they perceived poor relationship quality (Gabriel et al., 2016).

Third, the exploratory analyses revealed interesting findings about the pervasive effects of a couple's comorbidity on supportive and common DC, and add evidence of the importance of considering the couple as the unit of analysis and intervention. The emotional burden experienced by some of the partners of women with high levels of depressive symptoms in our study is consistent with previous studies (Field et al., 2006) and may contribute to an accumulation of stress-inducing situations: couples are expected to manage the usual reorganizations of the prenatal period while coping with their own and their partners' emotional distress. Our findings suggest that the additional demands that may arise within those couples affect all dimensions of dyadic adjustment, and primarily positive rather than negative dimensions of DC.

Finally, our findings suggest that, whereas the two groups of couples differ in the engagement in DC behaviours, they did not differ in the broad DC process. That is, one partner's communication of stress was weakly associated with the other partner's engagement in DC either in couples with a woman with a positive or a negative EPDS screen. These findings did not support our fourth hypothesis and suggest that more complex processes (e.g., the extent to which one vs. both partners are stressed, partner's ability to decode signs of stress) characteristic of the STM (Bodenmann, Randall, & Falconier, 2016) should be taken into account in further research addressing this topic. However, one finding deserves particular attention: in both groups of couples, the more the men communicate stress, the more the women engage in joint strategies to manage the stress experienced together (e.g., sharing negative emotions, joint search for information; Bodenmann et al., 2016). Research on gender differences could explain our findings. Because women tend to be more relational and interdependent with others as well as more sensitive to their partners' needs than men (Cross, Bacon, & Morris, 2000; Neff & Karney, 2005), they are likely to be more vulnerable to become stressed too (i.e., stress contagion; Bodenmann et al., 2016) and, therefore, to engage in joint strategies to respond to the shared stress within the couple. Surprisingly, our findings suggest that women experiencing high depressive symptoms actively participate in a shared coping process when their partners request support, perhaps because this way of coping is less demanding than the traditional support provided from one partner to the other. Longitudinal studies are needed to investigate these relationships.

Strengths and Limitations

By focusing on an important indicator of adjustment during the perinatal period, considering each member's perception of their own and the other's DC behaviours as well as distinct dimensions of dyadic adjustment, this study provides important insights into the interpersonal strategies used by couples to cope with pregnancy-related demands. Particularly, examining the interplay between each partner's stress communication and the other's DC responses provides us an initial understanding of the DC process in couples in which the woman was experiencing high levels of depressive symptoms and couples in which the woman presented minimal or no depressive symptoms during pregnancy.

This study comprises some limitations, such as its cross-sectional design, the convenience sampling method at only one public health care setting, the sample's relative homogeneity, and the data collection through self-report questionnaires. Concerning the latter, the replication of this study incorporating observational approaches or interviews to assess dyadic interactions would offer more robust inferences. Additionally, the split of the sample into two groups was based on a self-report questionnaire rather than a diagnostic interview. However, besides the broad use of the EPDS to determine the presence of high levels of depressive symptoms, couples with a woman with a positive EPDS screen should be worthy of clinical attention, in order to improve the distress experienced and prevent them reaching into a diagnostic category. Moreover, the reliability value of the EPDS in the sub-group of women with a negative EPDS screen was slightly below the acceptable threshold of 0.70, thereby our findings should be interpreted with caution. Finally, the two groups of couples differed significantly in terms of clinical characteristics (previous history of psychopathology and presence of obstetric complications). While for the former the differences were expected (and therefore not controlled), the presence of pregnancy complications, as a stressor potentially influencing DC requests, could have influenced the extent to which partners engaged in DC strategies, thereby confounding the interpretation of the findings (i.e., whether the results are related to the presence of high levels of depressive symptoms vs. pregnancy complications). For these reasons, its influence was controlled for in the analyses.

Implications for Clinical Practice

Our findings highlight the need to reconsider current approaches to psychological care, which are still predominantly mother-centred, and underscore the importance of screening both women and their partners for the presence of high levels of depressive symptoms during pregnancy. When one of both members of a couple with a positive screen are identified, mental health professionals should assess both partners' coping resources and assist them in jointly overcoming the distress experienced rather than only focusing on improving the support provided by the non-distressed partner (Bodenmann & Randall, 2013). Considering the additional challenges for DC when both partners are experiencing depressive symptoms, these implications are of utmost importance. Both members of the couple may benefit from DC-enhancing interventions to assist them in responding sensitively to the other's stress, which in turn may have a positive effect on couples' overall dyadic adjustment. These interventions delivered to individuals with depression and their partners have previously been shown to be effective in improving depressive symptoms, with additional benefits in reducing negativity within couples (Bodenmann et al., 2008).

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Empirical study IV

Does prenatal dyadic coping predict couples' postpartum psychosocial adjustment? Exploring actor and partner effects

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Does prenatal dyadic coping predict couples' postpartum psychosocial adjustment? Exploring actor and partner effects

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Abstract

The way couples jointly manage pregnancy-related demands may prevent both members from experiencing psychosocial maladjustment after childbirth. However, these processes are not yet understood. This study examined changes in dyadic coping (DC) and indicators of psychosocial adjustment (depressive and anxiety symptoms and quality of life [QoL]) from the second trimester of pregnancy (T1) to six weeks postpartum (T2) and explored the long-term influences of DC on the adjustment of both women and their partners. This study adopted a prospective quantitative dyadic longitudinal design. A total of 303 couples (Women age, *M* = 31.61; range: 19-43; Men age, *M* = 33.74; range: 19-52) answered self-report questionnaires assessing DC, depressive and anxiety symptoms, and QoL. Men's QoL (only first-time fathers) and stress communication decreased over time, as did common DC perceived by both partners. First-time mothers reported higher increases in negative DC. The more positive DC the women provided to men at T1, the higher the internalizing symptoms of women at T2; the more the women communicated stress at T1, the higher the internalizing symptoms of men at T2. Both partners' common DC at T1 positively predicted their QoL at T2. The larger the decrease in common DC over time, the greater the increase in internalizing symptoms of couples and the greater the decrease in their QoL. Couples seem to particularly benefit from a shared coping process during the transition to parenthood. Successful ways of communicating stress and adaptive subsequent coping responses should be promoted before, and fostered after, childbirth.

Keywords: dyadic coping; psychosocial adjustment; transition to parenthood; actor–partner effects; longitudinal.

Introduction

The birth of a child leads to several readjustments in the current familial system, which couples may experience as stressful and challenging (Nyström & Öhrling, 2004). During pregnancy, couples have to balance both partners' individuality (e.g., emotional changes) and increased interdependence within the couple, and they must redefine multiple relationships, such as with their parents, friends, coworkers and other children (Canavarro, 2001; Cowan & Cowan, 2000). After childbirth, couples must continue managing these reorganizations in addition to restructuring and negotiating family roles and adapting to their new responsibilities (Cowan & Cowan, 2000; St John, Cameron, & McVeigh, 2005). Because expecting/having a child affects both members of a couple as a unit, this period may be conceptualized as a context of dyadic stress (Bodenmann, 2005), in response to which unsuccessful coping efforts may impair couples' psychosocial adjustment.

On average, high levels of depressive symptoms affect 9% of men prenatally and 11% postnatally (Cameron, Sedov, & Tomfohr-Madsen, 2016), while the prevalence of anxiety symptoms is estimated to range from 4.1%-16.0% during pregnancy and 2.4%-18.0% after childbirth (Leach, Poyser, Cooklin, & Giallo, 2016). There is overall stability in men's symptoms over the prenatal and postnatal periods (Cameron et al., 2016; Leach et al., 2016), while the prevalence of depressive and anxiety symptoms among women is estimated to be relatively higher during pregnancy (17% and 23%, respectively) than after childbirth (13% and 15%, respectively) (Dennis, Falah-Hassani, & Shiri, 2017; Underwood, Waldie, D'Souza, Peterson, & Morton, 2016). In addition, a decline in quality of life (QoL) has been found to be common after childbirth (e.g., Condon, Boyce, & Corkindale, 2004); however, inconsistent findings have been reported concerning its course across the transition to parenthood (e.g., Condon et al., 2004; Guedes & Canavarro, 2014). Accordingly, it is important to improve our understanding of which dyadic resources, such as engagement in dyadic coping (DC), should be promoted early to help both women and their partners successfully adapt after childbirth.

The systemic-transactional model (STM; Bodenmann, 2005) conceptualizes stress experiences and coping from a "we stress" perspective, highlighting the interdependence and mutuality between members of a couple (i.e., stressors always directly or indirectly affect both partners in a committed relationship, and the resources of one partner expand

the resources of the other) (Bodenmann, Falconier, & Randall, 2017; Bodenmann, Randall, & Falconier, 2016). According to this framework, DC is as a process that is triggered when stress is communicated (either verbally or nonverbally) by one partner and decoded/interpreted by the other partner (or by both partners when dealing with a shared stressor). DC covers distinct forms of reactions that are grouped into positive and negative. Positive reactions include supportive DC (e.g., one partner helps with daily tasks, provides advice, helps reframe the situation, or expresses empathic understanding and solidarity), delegated DC (i.e., one partner takes over tasks at the demand of the other partner to alleviate his or her stress), and common DC (i.e., both partners cope with common stressors by engaging in joint coping efforts, such as joint problem solving and information seeking, or sharing of feelings). Examples of negative DC behaviors are when one partner provides support by minimizing the other's stress or using sarcasm or open disinterest (hostile reactions), when one partner provides support unwillingly and with no motivation (ambivalent reactions), or when one partner provides support without real motivation (superficial reactions) (Bodenmann, 2005).

Despite some theoretical overlap, DC has features that distinguish it from partner support, which is widely examined in the literature: it focuses on how stressors directly impact both partners such as the birth of a child, and it includes other types of stress management behaviors (e.g., joint coping efforts) in addition to the support provided by one partner to the other (i.e., supportive behaviors) (Bodenmann & Randall, 2012). Previous studies have largely documented the associations between partner support and couples' depressive and anxiety symptoms (for a review see Pilkington, Milne, Cairns, Lewis, & Whelan, 2015), although they have privileged an individual perspective (mostly taken into account the woman's perception of the couple's characteristics and her adjustment) and mostly adopted a cross-sectional design, thereby limiting inferences about the truly protective role of partner support in the long term (Mickelson & Biehle, 2017; Pilkington et al., 2015). In addition, research focused on QoL has mostly addressed the influence of broad social support making it difficult to separate the specific role of the partner (e.g., Emmanuel, St John, & Sun, 2012; Webster, Nicholas, Velacott, Cridland, & Fawcett, 2011).

Notwithstanding the contributions of existing research, at least two specificities of the transition to parenthood highlight the need to go beyond the broader coping and support literature in this area and address DC components. First, this is a period

characterized by great expression of needs and requests for support, particularly by women (Cowan & Cowan, 2000; Levy-Shiff, 1999); thus, the effects of stress communication underlying the activation of DC behaviors should be better understood. Second, as the transition to parenthood is a shared and interdependent process within couples, both partners' coping efforts are triggered to respond to the other's needs (i.e., partner-oriented behaviors) but also to promote one another's individual and relational well-being (i.e., couple-oriented behaviors) (Bodenmann, 2005). Therefore, disentangling the contribution of distinct DC strategies will help identify accurate prevention targets for couple-based interventions.

The literature on DC during the transition to parenthood is relatively recent and yields initial evidence of the associations between DC and dyadic adjustment (Molgora, Acquati, Fenaroli, & Saita, 2018) and depressive symptoms (Alves, Fonseca, Canavarro, & Pereira, 2018) during pregnancy. Stress communication and positive DC strategies have been found to be negatively associated with depressive symptoms (Rottmann et al., 2015) and positively associated with QoL in couples experiencing several health conditions (Ernst et al., 2017; Meier, Bodenmann, Mörgeli, & Jenewein, 2011; Vaske et al., 2015). Conversely, negative DC behaviors have been found to be associated with increased psychological distress (Rottmann et al., 2015) and poor QoL (Meier et al., 2011; Vaske et al., 2015). Moreover, these studies have demonstrated that, consistent with the Actor-Partner Interdependence Model (APIM; Kenny, Kashy, & Cook, 2006), one partner's DC influences not only his/her own adjustment (actor effects) but also his/her partner's adjustment (partner effects).

Although the transition to parenthood is a normative life transition, similar to the experience of dealing with one partner's serious health problem, this period is likely to be experienced as "we-stress" (Bodenmann et al., 2017; Bodenmann et al., 2016). Additionally, the adjustment process to the birth of a child may be marked by emotional (as previously described) and marital (Delicate, Ayers, & McMullen, 2018) strains, as it seems to be the case in the context of chronic illness (Meier et al., 2011; Rottmann et al., 2015). Therefore, because DC influences couples' adjustment to shared and potentially stressful events, the way that couples prenatally engage in DC strategies is likely to impact their adjustment to the birth of a child.

The results of these studies also elucidate that the adaptiveness of certain DC strategies may be dependent, for example, on the different roles of each member within the couple (e.g., patient vs. caregiver; Ernst et al., 2017; Rottmann et al., 2015). The traditional roles assumed by women (as the principal caregivers of the child) and men (as the breadwinners) during the transition to parenthood (Katz-Wise, Priess, & Hyde, 2010; Nyström & Öhrling, 2004) have been challenged by the increasing changes in family life over the past years (e.g., greater involvement of fathers in child care; Cabrera, Volling, & Barr, 2018). For instance, although the Portuguese cultural context strongly endorses traditional gender roles (Aboim, 2010), there is a dominant configuration of full-time dual-earner parents and a changing conception of fatherhood in Portugal (Escobedo & Wall, 2015; Wall & Leitão, 2017). Accordingly, this could lead to a new understanding of the transition to parenthood, which, contrary to previous studies (Levy-Shiff, 1999), may translate into more similarities than differences between women's and men's support needs in times of stress.

In sum, several studies have identified partner-related factors (e.g., supportive behaviors) associated with couples' postpartum individual adjustment, particularly women's depressive symptoms (Pilkington et al., 2015). However, few studies have assessed the impact of couples' dynamics on men's emotional outcomes or on (positive) dimensions of adjustment, such as QoL. Moreover, few studies have simultaneously adopted a longitudinal approach and a dyadic approach to take into account the mutual influences within the couple that are likely to occur across the transition to parenthood, and few have explored the role of specific DC strategies. Therefore, the aims of the present study were to (a) assess changes in indicators of individual adjustment (depressive and anxiety symptoms and QoL) and forms of DC from the second trimester of pregnancy (Time 1, T1) to six weeks postpartum (Time 2, T2) in both women and men; (b) examine the effects of DC (assessed at T1) on both women and their partners' psychosocial adjustment at T2 (see Figure 1); and (c) explore whether changes in DC over time would be associated with changes in both women and their partners' adjustment. Because having prior children vs. experiencing first-time parenthood may influence DC requests, we controlled for parity in all analyses to ensure that the effects of DC on couples' adjustment were not due to this variable. Given the exploratory nature of this study, we did not establish hypotheses regarding DC. Concerning the course of psychological distress over

time, we expected a decrease in women' levels of depressive and anxiety symptoms from T1 to T2.

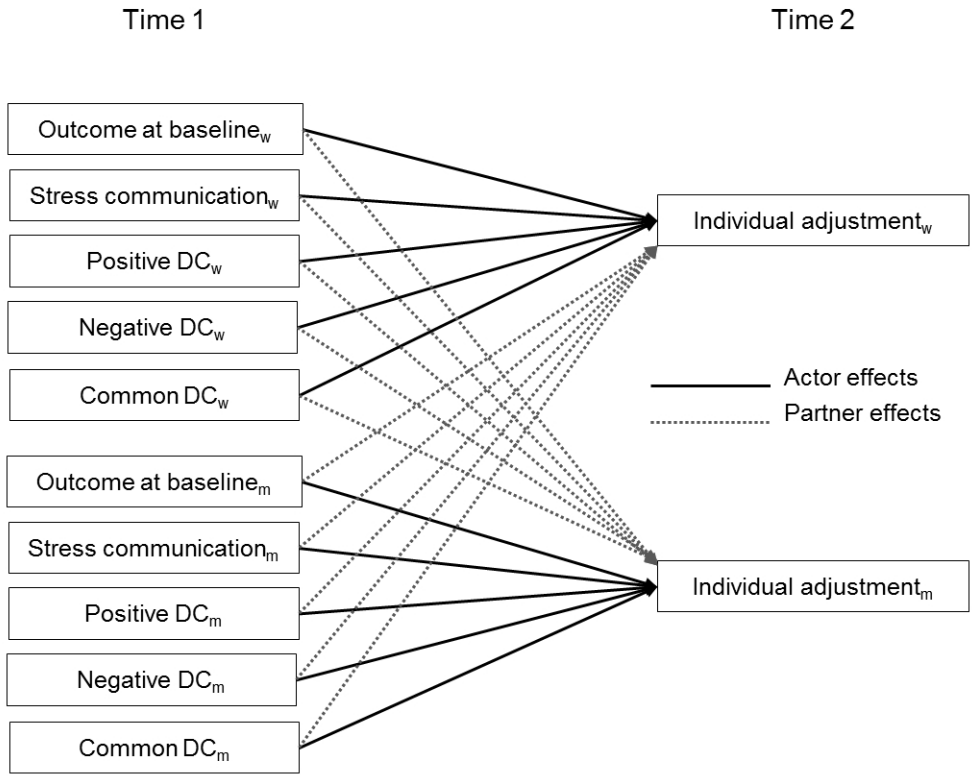

Figure 1 | Conceptual diagram showing the long-term actor and partner effects of dyadic coping (DC) dimensions on women and their partners' postpartum individual adjustment

Note. Partners' predictors and error disturbances for the two outcome variables were correlated but were omitted from the figure for clarity. This model was separately computed for each indicator of individual adjustment. Education and planned pregnancy were included as auxiliary variables in all models and parity, timing of pregnancy assessment and timing of postpartum assessment were included as covariates. Time 1 = second trimester of pregnancy; Time 2 = 6-weeks postpartum; w = women; m = men.

Method

Participants

The sample consisted of 303 heterosexual couples recruited during the second trimester of pregnancy (gestational weeks, *M* = 23.00, *SD* = 5.30; range: 12-37). Sixty-two percent were married couples living together and 34.3% were unmarried couples cohabitating (relationship length, *M* = 7.16 years, *SD* = 4.49). The majority was expecting

their first child (60.7%). Compared with men, women were younger (women: age, *M* = 31.61; *SD* = 4.66, men: age, *M* = 33.74; *SD* = 5.15; $t_{(300)}$ = -9.07, $p < .001$, $d = .61$), were more likely to have university education (61.5% vs. 41.8%; $\chi^2(2) = 50.45$, $p < .001$, $\varphi_c = 0.29$), and reported being employed with significantly less frequency (84.0% vs. 93.0%; $\chi^2(1) = 11.74$, $p = .001$, $\varphi_c = 0.14$). Regarding prior history of psychopathology, a high proportion of women reported previous psychological problems (34.4% vs. 5.5%; $\chi^2(1) = 77.09$, $p < .001$, $\varphi_c = 0.36$) and psychological treatment (27.3% vs. 9.5%; $\chi^2(1) = 31.36$, $p < .001$, $\varphi_c = 0.23$). A history of pregnancy loss was reported by 18.5% of women and a history of infertility by 10.6% of women. Most women had a planned (77.6%) and desired (97.0%) pregnancy, which occurred without gestational complications (65.0%).

Procedure

This study was approved by the Research Ethics Committees (blind for review) and one university hospital (blind for review). The inclusion criteria were: (1) women were in the course of the second trimester of a singleton pregnancy, without any complications with the baby (e.g., fetal anomalies or other medical problems) or other adverse clinical events, (2) the partners were in a relationship (formally married, cohabiting or dating), (3) both partners were at least 18 years old, and (4) both partners were able to read and understand Portuguese.

From November 2015 to May 2017, eligible women/couples followed in the (blind for review) were informed about the study by their obstetrician. Those who agreed to be contacted by the researchers were presented the study aims and invited to participate (consecutive sampling). A signed consent form was obtained from all participants and a copy was given to each member of the couple. At this time (second trimester of pregnancy – T1), each member of the couple received a set of questionnaires and was asked to complete them separately at home and return them in a sealed envelope at the next obstetric appointment. We focused specifically on the second trimester of pregnancy because this is a relatively stable trimester in terms of emotional adjustment (Cameron et al., 2016; Figueiredo & Conde, 2011), during which both partners become more aware of the baby's reality (Canavarro, 2001; Kowlessar, Fox, & Wittkowski, 2015). At 6 weeks postpartum (T2), couples were mailed two versions of the questionnaires (one for each partner) along with a prestamped envelope in which to return them after completion. At T1, a text message was sent to all couples one or two days before the appointment to

remind couples to bring the completed questionnaires to the appointment. At T2, the researchers sent out one reminder after 2 weeks.

A total of 611 women/couples were initially contacted at T1; 52 of these couples declined to participate, and eight did not meet the inclusion criteria at the time of the study's presentation. Of the 551 couples who agreed to participate, 335 returned questionnaires (participation rate: 60.8%), 32 of whom were excluded because the questionnaires were only filled out by the woman (n = 25) or showed, at T2, that they no longer met the criteria for participation. At T2, 290 of the 303 couples who were retained at T1 were mailed questionnaires (5 couples were not contacted due to perinatal loss and 8 due to the absence of delivery information); 138 of these couples returned questionnaires that were answered by both partners (participation rate: 47.6%). On average, couples returned the T2 questionnaires when their children were between 6 and 11 weeks (82.7%; M = 9.40, SD = 3.12, range: 6-21).

The differences between couples who completed the assessment at both times and those who dropped out were assessed regarding sociodemographic and obstetric data as well as baseline individual adjustment. Men from couples who participated at both assessment times were more likely to have completed high school than those who were contacted but dropped out at T2, $\chi^2(2) = 8.79$, $p = .012$, $\varphi_c = 0.18$. Women who were retained at T1 and T2 had a university education, $\chi^2(2) = 6.71$, $p = .035$, $\varphi_c = 0.15$, and a planned pregnancy, $\chi^2(1) = 4.60$, $p = .032$, $\varphi_c = 0.13$, with significantly more frequency than those who only participated at T1. No significant differences were found in the remaining variables.

Measures

Internalizing symptoms

Internalizing symptoms were operationalized in terms of depressive and anxiety symptoms. Antenatal and postpartum depressive symptoms were assessed with the Portuguese version (PV) of the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987; PV: Areias, Kumar, Barros, & Figueiredo, 1996). Participants should respond to 10 items on a 4-point response scale considering the last seven days. A total score is obtained ranging from 0 to 30. Higher values reflect higher levels of depressive symptoms. Cronbach's α values for the present sample were .86 for women and .83 for

men at T1 and .83 for women and .81 for men at T2. Anxiety symptoms were assessed using the Anxiety subscale (7 items) of the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983; PV: Pais-Ribeiro et al., 2007). Each item is answered on a 4-point scale, considering the last week. The total score ranges between 0 and 21. Higher scores denote higher levels of anxiety symptoms. Cronbach's α values for this study were .84 for women and .78 for men at T1 and .79 for women and .81 for men at T2. Because depressive and anxiety symptoms scores were reliably correlated ($r > .70$, $p < .001$) in both women and men and at each assessment point, the scores were averaged to create an aggregate measure of internalizing symptoms.

Quality of life

QoL was assessed using the EUROHIS-QOL 8-index (Power, 2003; PV: Pereira, Melo, Gameiro, & Canavarro, 2011), which consists of eight items (two for each domain of QoL – physical, psychological, social relationships, and environment) that are answered on 5-point response scales (e.g., from *not at all* to *completely*, from *very dissatisfied* to *very satisfied*) considering the previous two weeks. A global score is obtained from the sum of all items, with higher scores indicating a better perception of QoL. In this study, Cronbach's alphas were .76 for women and .80 for men at T1 and .78 for women and .85 for men at T2.

Dyadic coping

Distinct strategies of DC were assessed using the five subscales of the Dyadic Coping Inventory (DCI; Bodenmann, 2008; PV: Vedes, Nussbeck, Bodenmann, Lind, & Ferreira, 2013), assessing own stress communication (4 items; e.g., "I ask my partner to do things for me when I have too much to do"), own supportive DC (5 items; e.g., "I show empathy and understanding to my partner"), own delegated DC (2 items; e.g., "When my partner feels he/she has too much to do, I help him/her out"), own negative DC (4 items; e.g., "When my partner is stressed I tend to withdraw") and common DC (5 items; e.g., "We try to cope with the problem together and search for ascertained solutions"). Each item was rated on a 5-point scale (1 = *very rarely* to 5 = *very often*), and a total score for each subscale was calculated by computing the mean of the respective items. Higher scores indicate more of the behavior of interest. For simplicity, the two subscale scores of supportive and delegated DC were combined to yield an index of positive DC. This

procedure has been commonly used in research on DC (Nussbeck & Jackson, 2016). In our sample, Cronbach's α ranged from .67 (stress communication – women) to .89 (common DC – women) at T1 and from .73 (stress communication – women) to .91 (common DC – women) at T2.

Data Analysis

We conducted preliminary analyses with the Statistical Package for the Social Sciences (IBM SPSS, version 23.0) to determine univariate normality assumptions and the pattern of missingness. Each variable presented a normal distribution, with acceptable values for skewness (≤3) and kurtosis (≤10) (Kline, 2011). Missing data at the item level, which were random and less than 20% of the total scale/subscale used in this study, were handled by person mean substitution (i.e., missing values for an item were replaced with the mean of all of a given individual's completed items in the scale/subscale) in SPSS. This procedure has been shown to be acceptable to account for missing data on Likert scales as long as the number of items with missing responses for each scale constitutes at most 20% of the items (Downey & King, 1998). Sociodemographic, clinical and obstetric variables were not substituted. Missing data at the composite level were handled using full information maximum likelihood (FIML) in Mplus, an approach that uses all data available to estimate models (Enders & Bandalos, 2001). We added auxiliary variables (i.e., those variables that directly influence missingness: education and a planned pregnancy) in the structural equation modeling (SEM) models following Graham's (2003) recommendations, in order to minimize bias and enhance power (Enders, 2010; Graham, 2003).

Descriptive statistics were performed for sample characterization in SPSS, and chi-square tests and paired *t* tests were conducted to assess the differences between women and men. Descriptive statistics for and correlations between the main study variables at T1 and T2 were also computed. Parity was included as a covariate in all analyses, as well as the timing of pregnancy assessment and the timing of postpartum assessment in order to control for the considerable heterogeneity regarding compliance with the assessment schedule across participants. Covariates were only reported if significant. Univariate latent change score (LCS; McArdle, 2009) models were computed in Mplus, version 8 (Muthén & Muthén, 1998-2017), to examine changes over time in each variable. Change between T1 and T2 was modeled as a latent factor, which allowed us to estimate the mean/intercept of the change (μ_Δ) – a significant positive value indicates an increase and a

negative value indicates a decrease over time – and the variance/residual variance of the change (σ^2_Δ) – a significant value indicates heterogeneity across individuals regarding the average trajectory (Henk & Castro-Schilo, 2016; McArdle, 2009).

To assess the role of DC strategies in women's and their partners' individual adjustment, we conducted APIMs in Mplus. This approach accounts for the interdependence of women's and men's scores within dyads by specifying correlations between all of the predictor variables and between the error disturbances for the two outcome variables. Three APIMs were performed for each outcome assessed at follow-up (T2), considering all DC subscales assessed at baseline (T1) as independent variables and controlling for the baseline level of the respective outcome. Within the same model, it allows estimating actor (i.e., the degree to which a person's own DC predicts that person's individual adjustment) and partner (i.e., the degree to which a person's partner's DC predicts that person's individual adjustment) effects for both members of the couple. All predictors were centered around the grand mean and unstandardized path coefficients and their standard errors were reported (Kenny et al., 2006). Finally, to examine whether changes in DC subscales were related to changes in individual adjustment over time, we conducted two-wave LCS models (2W-LCS; Henk & Castro-Schilo, 2016). This approach has been recently proposed to examine change-to-change effects with two-wave data; briefly, it provides estimates for the relationship among LCS factors. To increase interpretability of the means of the LCS factors, we used the original scores instead of the mean-centered scores, and regression coefficients were interpreted as with any linear regression (e.g., a positive regression coefficient indicates that higher/lower change scores in a variable are associated with higher/lower change scores in the other variable). The terms "higher" and "lower" should be substituted by "increases" and "decreases", respectively, when the mean of the LCS is significant (Henk & Castro-Schilo, 2016). Beyond considering the chi-square statistic – which needs to be statistically nonsignificant ($p > .05$) to indicate good model fit but is highly sensitive to large sample sizes (Marôco, 2010) – we assessed the models' fit based on additional criteria: a comparative fit index (CFI) > 0.95, a root-mean-square error of approximation (RMSEA) < .05, and a standardized root-mean-square residual (SRMR) < .08 (Hu & Bentler, 1998). Effect sizes were interpreted as follows: small: $d \geq .20$, $\varphi_c \geq .10$, $r \geq .10$, $R^2 \geq .02$; medium: $d \geq .50$, $\varphi_c \geq .30$, $r \geq .30$, $R^2 \geq .13$; large: $d \geq .80$, $\varphi_c \geq .50$, $r \geq .50$, $R^2 \geq .26$ (Cohen, 1988). Significance was set at the level $p < .05$.

Results

Individual Adjustment and DC in Women and Their Partners Over Time

As presented in Table 1, on average, women's engagement in common DC decreased and their negative DC increased over time. Parity was significantly associated with the LCS of negative DC (B = -0.33, p < .001), indicating that first-time mothers reported higher increases in negative DC (see Figure 2). A significant reduction in stress communication and common DC over time was observed among men. Men showed significant decreases in QoL over time, but this change was conditional on parity (B = 6.02, p = .001); the positive coefficient and Figure 2 indicate that first-time fathers reported higher decreases in QoL from T1 to T2. For both women and men, the intercept of the LCS for internalizing symptoms was statistically significant before accounting for the influence of parity (and the other covariates), suggesting that this variable somewhat influenced the trajectory of internalizing symptoms. For women, parity was significantly associated with the LCS of internalizing symptoms (B = -1.46, p = .001), suggesting that there were lower change scores for internalizing symptoms for women who had at least one child at home (see Figure 2). The significant heterogeneity across participants suggests that not all individuals manifested similar trajectories.

Table 1 | Individual adjustment and dyadic coping: descriptive statistics and univariate LCS models

	Time 1		Time 2		Time differences			
	Women	Men	Women	Men	Women		Men	
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	μ_Δ	σ^2_Δ	μ_Δ	σ^2_Δ
IS	5.62 (3.73)	4.50 (3.21)	5.04 (3.14)	4.10 (3.01)	-0.01	8.24***	-0.42	5.58***
QOL	72.91 (11.31)	75.72 (11.75)	74.75 (11.60)	74.15 (11.98)	0.60	100.92***	-3.36**	111.81***
SC	4.03 (0.60)	3.59 (0.66)	4.00 (0.65)	3.48 (0.75)	-0.10	0.38***	-0.18*	0.45***
PDC	3.97 (0.56)	3.92 (0.53)	3.96 (0.59)	3.88 (0.59)	-0.05	0.28***	-0.04	0.23***
NDC	1.61 (0.59)	1.72 (0.65)	1.57 (0.59)	1.69 (0.63)	0.12*	0.30***	0.04	0.35***
CDC	3.95 (0.75)	3.90 (0.69)	3.89 (0.83)	3.81 (0.74)	-0.16*	0.47***	-0.21***	0.32***

Note. LCS = latent change score; Time 1 = second trimester of pregnancy; Time 2 = 6 weeks postpartum; IS = internalizing symptoms; QOL = quality of life SC = stress communication; PDC = positive dyadic coping (DC); NDC = negative DC; CDC = common DC; μ_Δ = intercept of the latent change factor; σ^2_Δ = residual variance of the latent change factor. Women's education and planned pregnancy were included as auxiliary variables in the LCS models conducted for women and men's education in the LCS models conducted for men. The unstandardized estimates for μ_Δ and σ^2_Δ are adjusted for covariates (parity, timing of pregnancy assessment and timing of postpartum assessment).

* $p < .05$; ** $p < .01$; *** $p < .001$

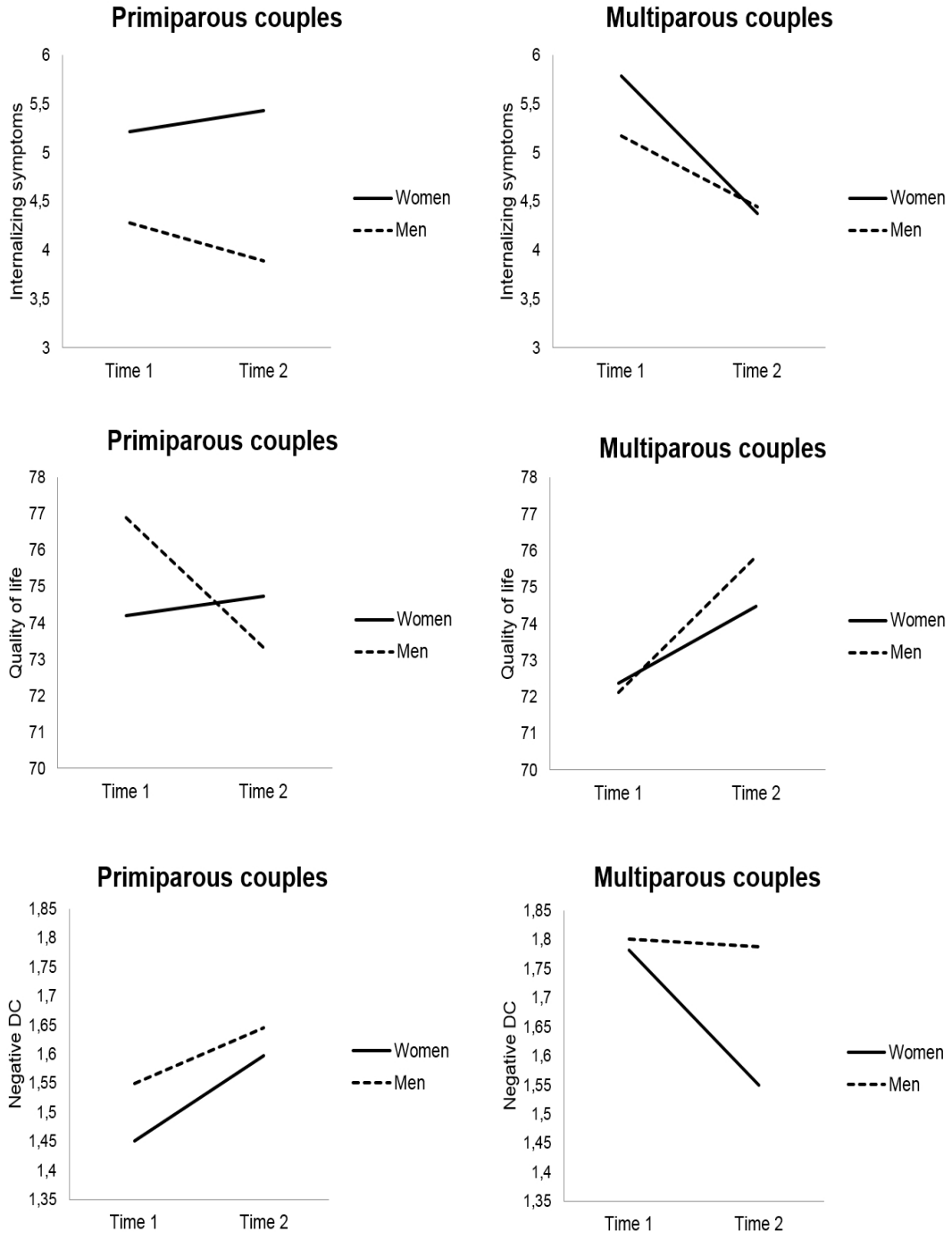

Figure 2 | Mean scores of internalizing symptoms, quality of life and negative dyadic coping (DC) by parity (primiparous vs. multiparous couples) and time (Time 1 = second trimester of pregnancy; Time 2 = 6-weeks postpartum), adjusted for timing of pregnancy assessment and timing of postpartum assessment

Note. Only the variables for which parity significantly predicted latent change scores are illustrated.

Actor and Partner Effects of DC at Pregnancy on Postpartum Individual Adjustment

Preliminary correlation analyses (data not shown) indicated significant and small to medium associations between DC subscales (T1) and adjustment outcomes (T2) for men, ranging from -.19 (between stress communication and internalizing symptoms; $p < .05$) and .42 (between common DC and QoL; $p < .001$). Among women, positive DC and common DC were significantly associated with QoL ($r = .25$ and .24, $p < .01$, respectively). Significant associations were found among DC subscales at T1, ranging from small (between stress communication and negative DC among women; $r = -.24$, $p < .001$) to large (between positive DC and common DC; $r = .64$ for men and .68 for women, $p < .001$). Correlations within dyads indicated that partner's scores were significantly associated with one another, ranging from .14 (for stress communication at T1; $p < .05$) to .59 (for common DC at T1; $p < .001$). These findings suggest nonindependence between partners' data and thus support the relevance of adopting a dyadic approach – the APIM – that allows incorporating both actor and partner effects.

The selection of the model included preliminary steps. Because we did not expect differences between women and men, we first constrained all the actor effects and partner effects, respectively, to be equal across gender, and we assessed the model's fit of these constrained models. We obtained a significant chi-square test statistic ($p < .05$) for the model of internalizing symptoms (internalizing symptoms: $\chi^2(13) = 33.09$, $p = .002$; QoL: $\chi^2(13) = 16.61$, $p = .218$). To identify model misspecification, we examined the modification index (MI) in combination with the expected parameter change (EPC), as recommended by Saris, Satorra and Sörbom (1987). Accordingly, we gradually unconstrained the parameters and observed a change in the model fit (χ^2 difference test for nested models; $\Delta\chi^2$). All the paths could be equalized across gender without significant declines in the model fit, except the effects of prior children ($\Delta\chi^2 = 7.65$, $\Delta df = 1$, $p = .006$), the actor effects of positive DC ($\Delta\chi^2 = 9.44$, $\Delta df = 1$, $p = .002$) and the partner effects of stress communication ($\Delta\chi^2 = 8.24$, $\Delta df = 1$, $p = .004$), which were left to vary freely between women and men. Because positive DC and common DC were strongly intercorrelated at T1, concerns associated with multicollinearity were addressed by excluding one of the two DC subscales at a time and then examining the coefficient for the other DC subscale. These alternative models did not yield substantial differences from the reported results; therefore, we opted to present the full models. The final models fit the data well

(internalizing symptoms: χ^2 = 11.84, *df* = 10, *p* = .296; RMSEA = 0.025; SRMR = 0.019; CFI = 0.998; QoL: χ^2 = 16.61, *df* = 13, *p* = .218; RMSEA = 0.030; SRMR = 0.029; CFI = 0.996) and explained a high proportion of variance in the outcomes (see Table 2).

Internalizing symptoms. Women's positive DC at T1 significantly and positively predicted their own internalizing symptoms at T2. Women with prior children tended to report lower levels of internalizing symptoms at T2. Finally, women's stress communication at T1 positively predicted men's internalizing symptoms at T2.

QoL. Along with having prior children, higher common DC at T1 predicted higher QoL at T2 for all participants.

Table 2 | Effects of dyadic coping at pregnancy (T1) on women and their partners' individual adjustment at postpartum (T2)

	Women				Men			
	IS R^2 = .50		QOL R^2 = .39		IS R^2 = .49		QOL R^2 = .39	
	B (SE)	*p*	*B (SE)*	*p*	*B (SE)*	*p*	*B (SE)*	*p*
Women								
Baseline score of the outcome	0.60 (0.05)	< .001	0.58 (0.06)	< .001	0.06 (0.05)	.217	0.03 (0.06)	.620
Stress communication	0.32 (0.26)	.223	1.42 (1.08)	.187	**0.77 (0.35)**	**.026**	0.69 (1.07)	.519
Positive dyadic coping	**1.05 (0.45)**	**.019**	-2.72 (1.57)	.084	-0.33 (0.36)	.358	2.49 (1.55)	.108
Negative dyadic coping	0.03 (0.29)	.909	0.88 (1.20)	.464	-0.27 (0.29)	.338	1.70 (1.19)	.153
Common dyadic coping	-0.26 (0.32)	.430	**3.64 (1.38)**	**.009**	0.17 (0.32)	.604	-1.44 (1.39)	.299
Men								
Baseline score of the outcome	0.06 (0.05)	.217	0.03 (0.06)	.620	0.60 (0.05)	< .001	0.58 (0.06)	< .001
Stress communication	-0.60 (0.35)	.092	0.69 (1.07)	.519	0.32 (0.26)	.223	1.42 (1.08)	.187
Positive dyadic coping	-0.33 (0.36)	.358	2.49 (1.55)	.108	-0.50 (0.43)	.252	-2.72 (1.57)	.084
Negative dyadic coping	-0.27 (0.29)	.338	1.70 (1.19)	.153	0.03 (0.29)	.909	0.88 (1.20)	.464
Common dyadic coping	0.17 (0.32)	.604	-1.44 (1.39)	.299	-0.26 (0.32)	.430	**3.64 (1.38)**	**.009**
Parity[a]	**-1.33 (0.43)**	**.002**	**3.27 (1.27)**	**.010**	0.12 (0.40)	.771	**3.27 (1.27)**	**.010**

Note. Unstandardized maximum likelihood estimates are described. Significant estimates are in bold. [a] 0 – primiparous couples; 1 – multiparous couples. IS = internalizing symptoms; QOL = quality of life.

Actor and Partner Effects of Change in DC on Change in Individual Adjustment

The univariate LCS models presented above emphasize that parity affects women's and men's change scores differently over time; therefore, this variable was left estimable in all models. The remaining parameters (i.e., the actor and partner effects between each change score and the effects of the remaining covariates on the change scores) were fixed to be equal across women and men. To avoid problems of multicollinearity, we analyzed the correlations among the change scores corresponding to each DC subscale. The correlations ranged from small (r = -.11 between the change in stress communication and the change in negative DC among men) to medium (r = .49 between the change in common DC and the change in positive DC among men), and therefore, severe multicollinearity was not evident. Accordingly, we opted to present the results of the full models. The models yielded a reasonably good fit (internalizing symptoms: χ^2 = 157.52, df = 100, p < .001; RMSEA = 0.044; SRMR = 0.070; CFI = 0.971; QoL: χ^2 = 141.95, df = 100, p = .004; RMSEA = 0.037; SRMR = 0.064; CFI = 0.978) (see Table 3). For women, higher decreases in common DC (μ_Δ = -0.15, p = .009; σ^2_Δ = 0.46, p < .001) were associated with higher change scores for internalizing symptoms (μ_Δ = -0.28, p = .308; σ^2_Δ = 7.33, p < .001) and lower change scores for QoL (μ_Δ = 1.03, p = .320; σ^2_Δ = 93.80, p < .001). For men, higher decreases in common DC (μ_Δ = -0.16, p = .002; σ^2_Δ = 0.34, p < .001) were associated with increases in internalizing symptoms (μ_Δ = -0.80, p = .002; σ^2_Δ = 5.89, p < .001) and decreases in QoL (μ_Δ = -2.16, p = .042; σ^2_Δ = 104.85, p < .001). The significant residual variances indicated that there was considerable variability in these patterns of change.

Table 3 | Associations between changes in dyadic coping and changes in individual adjustment

	Women				Men			
	Change in IS R^2 = .16		Change in QOL R^2 = .13		Change in IS R^2 = .12		Change in QOL R^2 = .16	
	B (SE)	*p*	*B (SE)*	*p*	*B (SE)*	*p*	*B (SE)*	*p*
Women change								
Stress communication	-0.32 (0.24)	.183	0.88 (0.97)	.367	0.17 (0.25)	.498	-0.95 (0.97)	.327
Positive dyadic coping	-0.16 (0.32)	.633	1.74 (1.30)	.179	-0.17 (0.33)	.602	0.88 (1.30)	.500
Negative dyadic coping	-0.28 (0.25)	.276	1.43 (1.02)	.159	0.33 (0.25)	.190	-1.83 (1.02)	.072
Common dyadic coping	**-1.09 (0.28)**	**< .001**	**4.53 (1.12)**	**< .001**	-0.27 (0.27)	.332	-1.03 (1.14)	.368
Men change								
Stress communication	0.17 (0.25)	.498	-0.95 (0.97)	.327	-0.32 (0.24)	.183	0.88 (0.97)	.367
Positive dyadic coping	-0.17 (0.33)	.602	0.88 (1.30)	.500	-0.16 (0.32)	.633	1.74 (1.30)	.179
Negative dyadic coping	0.33 (0.25)	.190	-1.83 (1.02)	.072	-0.28 (0.25)	.276	1.43 (1.02)	.159
Common dyadic coping	-0.27 (0.27)	.332	-1.03 (1.14)	.368	**-1.09 (0.28)**	**< .001**	**4.53 (1.12)**	**< .001**
Parity[a]	**-1.50 (0.44)**	**.001**	1.58 (1.67)	.345	0.06 (0.41)	.881	**4.46 (1.75)**	**.011**

Note. Unstandardized maximum likelihood estimates are described. Significant estimates are in bold. [a] 0 – primiparous couples; 1 – multiparous couples. IS = internalizing symptoms; QOL = quality of life.

Discussion

This longitudinal study extends previous research that recently applied the STM to the transition to parenthood by considering both the prenatal and postnatal periods as well as internalizing symptoms and QoL as indicators of individual adjustment. Other strengths of this study include the consideration of the couple as the unit of analysis, which made it possible to explore the partner effects (mutual impact) as well as the beneficial and prejudicial effects (differential impact) of DC behaviors within couples that may have otherwise been missed. Several main findings emerged from this study.

First, contrary to what we had hypothesized, although women's average levels of internalizing symptoms tended to be lower at postpartum than during pregnancy, decreases over time were not significant. Our findings showed a trend towards improved psychological adjustment among experienced vs. first-time mothers, which is very similar to the pattern observed in previous studies (Dipietro, Costigan, & Sipsma, 2008; Figueiredo & Conde, 2011). Moreover, first-time mothers are likely to manifest more emotional adjustment difficulties than experienced mothers in the early postpartum period, as previously observed (Gameiro, Moura- Ramos, & Canavarro, 2009; Glavin, Smith, & Sørum, 2009). This pattern of results could explain the lack of emotional warmth and empathy from pregnancy to postpartum by first-time mothers when their partners communicated stress (i.e., not taking the partner's stress seriously, engaging in withdrawal behaviors), since previous studies suggested a positive association between negative DC and psychological symptoms (Alves et al., 2018; Rottmann et al., 2015). Similarly, first-time fathers' well-being in certain life domains tends to decrease over the mid-pregnancy and early postnatal period, while an opposite trajectory is observed for experienced fathers. However, we should note that experienced fathers seem to present lower QoL during pregnancy than first-time fathers but that first-time fathers reached multiparous' levels of QoL when becoming parents. A past experience of parenthood appears to be a protective factor for both partners' QoL at six weeks postpartum. This pattern of results could be attributable to the changes associated with the first-time transition to parenthood (Cowan & Cowan, 2000), in which couples may present some initial adjustment difficulties (e.g., Epifanio, Genna, De Luca, Roccella, & La Grutta, 2015). In contrast, the absence of the novelty element (Gameiro et al., 2009) and the presence of more realistic beliefs about parenthood (Sockol & Battle, 2015) may have contributed to multiparous couples' better adjustment over time.

Regardless of whether they were expecting a first or subsequent child, couples engaged less in common DC over time. As the pregnancy progresses, women experience several physical changes that, along with family and household responsibilities, may gradually contribute to intracouple imbalances regarding the provision of support. That is, in line with the predominant mother-centered medical care of this phase, men are likely to become more active in the couple's relationship (Darwin et al., 2017), requesting less support (Levy-Shiff, 1999), than women. Indeed, we observed that men disclose less stress to their partners over time, and it is possible that this type of protective role towards women (Cowan & Cowan, 2000; Darwin et al., 2017) explains both their partners' lower engagement in shared coping efforts (i.e., mutual efforts to cope with stress together are expected when both partners share stress). Less time spent together, tiredness due to lack of sleep and decreases in intimacy, which are often observed after childbirth (Delicate et al., 2018; St John et al., 2005), could also explain our findings.

The finding that both partners have higher QoL when they actively participate in the coping process jointly supports the conceptualization of the transition to parenthood as a shared experience. Handling pregnancy concerns in a more or less symmetrical way (e.g., mutual efforts to calm one another's pregnancy-related worries and uncertainties) may prevent both partners from feeling overwhelmed in the long term. Interestingly, although only marginally significant associations were found, the results indicated a trend towards lower QoL among couples who engaged more in positive DC. Contrary to the protective resource of common DC, engaging in supportive or delegated DC strategies to help each other cope with stress, while also facing significant changes and concerns during pregnancy (Canavarro, 2001; Kowlessar et al., 2015), can lead to increased overtiredness and then negatively impact both partners' perception of their overall well-being. These findings come to challenge the traditional role of fathers as the support provider and mothers as the care recipients (Darwin et al., 2017), highlighting that women *and* men benefitted mostly and equally from joint coping strategies regarding numerous dimensions of life. This rationale is supported by the result that the more women engaged in positive DC strategies to help their partners cope with stress during pregnancy, the more depressed and anxious they felt after childbirth. Considering that they are the main source of support for men during pregnancy (Forsyth, Skouteris, Wertheim, Paxton, & Milgrom, 2011), engaging in DC strategies with their partners may have contributed to additional burdens at this sensitive time (Staneva, Bogossian, & Wittkowski, 2015) and

therefore led to higher levels of psychopathological symptoms in the long term. However, future studies are needed to both replicate these findings and examine these hypothetical interpretations.

More communication of stress by women was found to increase men's internalizing symptoms, while there was a trend in which clear communication of stress by men during pregnancy was protective against women developing stronger internalizing symptoms. This is in line with the mixed findings found in the literature, which has suggested that stress communication could be either considered an adaptive strategy (Vaske et al., 2015) or an unfavorable one when the negative content of the discussion takes a central role in the relationship (Meier et al., 2011). For instance, women reported communicating their stress more often than men during pregnancy (Alves et al., 2018; Molgora et al., 2018), which can be perceived as burdensome for men and thus contribute to higher levels of psychological distress. Conversely, because women tend to be more relationship-oriented and sensitive to their partners' stress than men (Cross, Bacon, & Morris, 2000; Neff & Karney, 2005), men's sharing their stress may make women more aware of their partners' experiences and encourage discussions within couples; such discussions, if well managed, could contribute to women' postpartum psychological adjustment (Ramchandani, Richter, Stein, & Norris, 2009).

Surprisingly, while common DC at pregnancy was not found to be a significant predictor of internalizing symptoms, the observed reduction in joint coping efforts over time was associated with increases in levels of psychological distress and decreases in QoL. One possible explanation is that over the course of pregnancy to the time after childbirth, stressors increasingly concern both partners, such as the changes in the relationship with one another, the need to share parenting responsibilities and the need to negotiate new household routines (St John et al., 2005). The gradual reduction of adaptive strategies to jointly address these issues (e.g., spending time together and openly discussing one another's concerns; Deave, Johnson, & Ingram, 2008) could therefore make it difficult to adjust to the birth of a child.

Limitations of the Study

This study presents limitations, such as the high attrition over time, with lower retention rates for less educated couples, which limited the generalizability of the findings.

However, the technique used for handling missing data (FIML) has been considered advantageous for handling a high proportion of missing data (Enders, 2010); accordingly, along with the inclusion of auxiliary variables, our findings can be interpreted with confidence. By assessing DC only with a self-report questionnaire, complex dyadic processes and interactions have been more difficult to capture. Studies with observational data are warranted. Additionally, given the low internal consistency of the stress communication subscale for both women and men, with reliability values marginally below the acceptable threshold of 0.70, our findings should be interpreted with caution. Because the first and third trimesters of pregnancy comprise specific stressors (i.e., pregnancy acceptance and proximity of delivery time, respectively), it would be interesting to examine whether the effects of DC would be similar or different across the pregnancy trimesters. Finally, we did not collect data about income and parental leave (in terms of use and length), which may have influenced couples' adjustment to the birth of a child.

Conclusions and Practical Implications

The couples seemed to benefit more from a shared coping process than from specific strategies to assist their partners in managing prenatal stress. This finding informs us about a relevant dyadic process to foster among first-time and experienced parents and, importantly, emphasizes that approaches aimed at enhancing support processes for couples during the transition to parenthood need to be reconsidered. Rather than focusing excessively on increasing the support provided by one partner to the other, health professionals should help couples enhance ways to strengthen and maintain their engagement in joint coping efforts to handle common daily stressors across the transition to parenthood. Importantly, such strategies should be promoted before, and fostered after, childbirth (e.g., by including a DC component in current pre and postpartum educational programs). While programs aimed to improve DC skills among couples already exist and whose efficacy has been acknowledged (e.g., Couples Coping Enhancement Training [CCET]; Bodenmann & Shantinath, 2004), our findings suggest that mental health professionals that intended to apply these interventions with couples in maternity care settings should be aware of both the similar (regarding common DC) and differential (regarding positive DC and stress communication) impacts of specific DC strategies within couples. Accounting for the mutual influences between partners and considering the sociocultural changes around the role of fathers (Cabrera et al., 2018),

health professionals should address men's needs along with those of the women. Accordingly, partner-inclusive interventions should be promoted by taking advantage of men's presence at antenatal obstetric appointments and educational sessions.

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Empirical study V

Romantic attachment, dyadic coping, and parental adjustment across the transition to parenthood

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Romantic attachment, dyadic coping, and parental adjustment across the transition to parenthood

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Abstract

This study explored the mediating role of common dyadic coping (common DC) on the longitudinal associations between attachment-related anxiety and avoidance and parental adjustment to the first year postpartum. Ninety-two Portuguese couples completed self-report questionnaires of romantic attachment, common DC, parenting stress and parental confidence. Results showed that more avoidant parents (at mid-pregnancy) engaged less in common DC (at 6-weeks postpartum) which, consequently, increased their partner's parenting stress (only in mothers) and decreased their partner's parental confidence (in both parents) at 6-9 months postpartum. Anxiety attachment representations did not predict parents' adjustment, neither directly nor indirectly. Interventions aimed at preventing adjustment difficulties to early parenthood in more avoidant parents should focus on enhancing their common DC strategies soon after childbirth.

Keywords: attachment, common dyadic coping, parenting stress, parental confidence, transition to parenthood, interdependence.

Introduction

Increased attention has been given to couples' parenting stress and parental confidence during the first year postpartum, a time characterized by challenges and reorganizations in couples' lives (Cowan & Cowan, 2000; Nyström & Öhrling, 2004). Parenting stress reflects parents' perceptions of difficulties in adjusting to their parenting role, problems with children who are perceived as difficult and stress due to dysfunctional interactions with their child (Abidin, 1995). In contrast, parental confidence, also framed as perceived parenting self-efficacy or a sense of competence (Crncec, Barnett, & Matthey, 2010), reflects parents' confidence in their parental role (i.e., recognizing their child's needs and performing caretaking tasks) (Badr, 2005).

Over the course of the child's first year, parents' perceived levels of parenting stress tend to decrease (Vismara et al., 2016), whereas parenting confidence tends to increase (Biehle & Mickelson, 2011; Hudson, Elek, & Fleck, 2001). However, the presence of certain risk factors, such as insecure attachment representations, may undermine parents' positive adjustment (Jones, Cassidy, & Shaver, 2015). Given the well-known negative repercussions of high parenting stress and low parental confidence on parental and child outcomes (Crnic & Low, 2002; Jones & Prinz, 2005), it is important to better understand *how* insecure attachment representations are associated with parenting stress and parental confidence during the first year postpartum. Romantic attachment is likely to influence how each partner interacts with one another after childbirth (Howard, 2010; Simpson & Rholes, 2018) and is linked to common dyadic coping (common DC), the skill of coping together as a couple with a shared external stressor (Bodenmann, 2005; Bodenmann, Falconier, & Randall, 2017). Hence, the current study aims to explore whether common DC mediates the association between insecure attachment representations and parenting stress or parental confidence.

Romantic Attachment and Early Parental Adjustment

Adult romantic attachment is widely conceptualized along two dimensions: anxiety (i.e., representations of the self as unworthy of love and care), which is associated with intense worries about being underappreciated and possibly abandoned by romantic partners and with a strong desire for closeness and security in romantic relationships, and avoidance (i.e., representations of the other as unresponsive), which is related to

discomfort with emotional intimacy, dependency, and closeness with romantic partners. Individuals who score low on both dimensions are considered to have more secure representations in their romantic relationships (Brennan, Clark, & Shaver, 1998; Simpson & Rholes, 2012). According to the Attachment Diathesis-Stress Process Model (Simpson & Rholes, 2018), attachment insecurity is likely to become more pronounced during the transition to parenthood (in response to stress-inducing events), and operates as a diathesis that influence attachment behaviors and perceptions of the partner which, in turn, lead to negative interpersonal and intrapersonal outcomes. Consistent with this, attachment representations have been linked to parenting appraisals, behaviors and emotions (Jones et al., 2015). In particular, parents with more avoidant attachment representations face challenges after childbirth in being sensitive and responsive toward their baby's needs, and they usually strive to maintain distance from others' distress to keep their attachment system deactivated (Rholes, Simpson, & Friedman, 2006). Research shows that parents with high scores on avoidance reported more difficulties in adjusting to parenthood (Kazmierczak, 2015), reported higher parenting stress (Rholes et al., 2006; Trillingsgaard, Elklit, Shevlin, & Maimburg, 2011), and lacked knowledge of child development (Howard, 2010). They also reported lower parental satisfaction (Rholes et al., 2006) and less perceived parenting self-efficacy (Kohlhoff & Barnett, 2013) during the first year after childbirth. Similar associations have been found for the anxiety dimension, with general adjustment to motherhood (Kazmierczak, 2015), mothers' parenting stress (Mazzeschi, Pazzagli, Radi, Raspa, & Buratta, 2015; Trillingsgaard et al., 2011), fathers' parenting stress (Howard, 2010; Schoppe-Sullivan, Settle, Lee, & Dush, 2016) and parenting efficacy (Howard, 2010) as well as parents' satisfaction with parenting (Calvo & Bianco, 2015). Recent studies have yielded growing evidence for the potential mediating role of couples' characteristics on the influence of romantic attachment on parental adjustment. For example, Kazmierczak (2015) found that more insecurely attached parents during pregnancy perceived their partners as less empathic toward them after childbirth, which negatively affected their adjustment to parenthood. Schoppe-Sullivan et al. (2016) reported that expectant fathers' attachment-related anxiety (but not avoidance) predicted their parenting stress and satisfaction at nine months postpartum by means of their perceptions of supportive co-parenting at three months postpartum. Another study conducted with parents of young children (up to six years old) showed that mothers and fathers with higher scores on attachment-related avoidance and anxiety reported less

dyadic adjustment, which, in turn, was associated with less parenting self-efficacy (Calvo & Bianco, 2015). A promising dyadic mediator that has not yet been studied during the transition to parenthood is common DC.

Common Dyadic Coping and the Transition to Parenthood

After having a baby, couples need to adapt to the changes in their relationship as a couple (e.g., decreased physical intimacy) and with others (e.g., own parents, friends, co-workers), negotiate their parenting responsibilities and establish new household routines (Cowan & Cowan, 2000; St John, Cameron, & McVeigh, 2005). Moreover, women and their partners may experience some changes in different ways (e.g., unlike their partners, women face several physical changes), which could be a source of increased stress for the couple (e.g., one partner's stress could spill over on the other and then impact both; Westman, 2011). The birth of a child is therefore an example of a dyadic stressor, as it concerns the couple directly (McGoldrick & Carter, 2003), and both partners' coping efforts are triggered not only to manage one's own stress but also to respond to the other's needs (partner-oriented behaviors) and shared concerns (couple-oriented behaviors). This interdependent process of coping (DC), activated when one partner communicates stress to the other, is the core tenet of the systemic-transactional model (STM; Bodenmann, 2005), which posits that stressors always directly or indirectly affect both members of the couple (Bodenmann et al., 2017; Bodenmann, Randall, & Falconier, 2016).

Common DC is a specific form of DC, which takes place when both partners share the same stressor ("we-stress" appraisals) and cope with it together – rather than only supporting each other –, in a complementarily or symmetrically way (joint coping efforts). It includes strategies such as joint problem solving and information seeking, sharing of feelings, joint reframing of the situation, and mutual commitment. The experience of the transition to parenthood as a "we stress" period rather than exclusively an individual transition for mothers and fathers is likely to reinforce the belief that mothers and fathers are a team when facing potential stressors, which is in line with core assumptions of the theory of resilience and relational load (TRRL; Afifi, Merrill, & Davis, 2016). The TRRL, a framework similar to the STM, posits that when relational partners have a strong communal orientation toward life's stressors (i.e., "the ability to think of one's relationship(s) as a cohesive unit when managing stress and approaching life"; p. 669), they

are motivated to invest in their relationships, therefore enhancing their positive emotional reserves. Consequently, this emotional capital promotes secure-based appraisals and behaviors during times of stress, which, in turn, foster resilience and efficacy, reduce perceived and physiological stress, and enhance health.

Accordingly, it matters significantly how effectively parents cope together with the multiple peri- and postnatal common stressors (e.g., sleep deprivation, less social contact and leisure time, complicated schedules and time demands, potential disagreements with family of origin) and couples that display common DC strategies should report fewer adjustment problems. A recent study supports this assumption, by demonstrating that common DC was associated with better dyadic adjustment in the last trimester of pregnancy (Molgora, Acquati, Fenaroli, & Saita, 2018).

Common Dyadic Coping as a Link between Romantic Attachment and Early Parental Adjustment

Whether a partner engages in mutual coping behaviors might vary according to the degree of insecure attachment representations toward the romantic partner. According to attachment theory, the interdependence and enhanced interpersonal cohesion required to communally manage stressful demands should threaten core concerns in individuals with more avoidant attachment representations (Mikulincer & Shaver, 2016). Persons with higher avoidance typically strive to maintain distance (behaviorally and cognitively) from a stress- inducing event; they avoid expressing distress to their partner, seeking support from him/her, or approaching their distressed partner to provide support in times of need (Feeney & Collins, 2001; Simpson, Rholes, & Nelligan, 1992; Simpson, Rholes, Oriña, & Grich, 2002). Hence, these individuals may not perceive common DC strategies as helpful in alleviating distress because of negative expectations about their partner's availability (Mikulincer & Shaver, 2016). The results regarding anxiety attachment representations are less consistent. When managing their own stress, individuals with more anxious attachment representations may either intensify the expression of distress or restrain approach tendencies in order to avoid rejection (Mikulincer & Shaver, 2016). When dealing with their distressed partners, these individuals could engage in a diversity of partner-oriented behaviors (e.g., positive and negative supportive behaviors; Collins & Feeney, 2000; Feeney & Collins, 2001), which therefore are difficult to predict (e.g., Simpson et al., 2002).

Either because they distance themselves from stress-inducing events or because they direct their attention toward their own attachment-related concerns, individuals with more insecure attachment representations may be unavailable to engage in joint coping efforts to deal with a shared stressor. Emerging evidence shows that insecure romantic attachment representations are associated with less common DC among university students (only avoidance; Levesque, Lafontaine, & Bureau, 2017) and couples living together (both anxiety and avoidance; Batinic & Kamenov, 2017). Because common DC implies the active engagement of both partners, it can be expected that both the more anxious/avoidant person (i.e., *actor effect*) and his or her partner report, the less common DC (i.e., *interpersonal* or *partner effects*). Research addressing the links between common DC and parental variables is relatively recent. For example, Zemp, Milek, Cummings, and Bodenmann (2017) found that common DC was associated with decreases in co-parenting conflict among parents of children aged between 2 to 12 years, suggesting that common DC is an important resource for successful coparenting. In turn, in the context of the transition to parenthood, several studies showed the benefits of co-parental support with regard to parenting stress and parenting self-efficacy (e.g., Biehle & Mickelson, 2011; Schoppe-Sullivan et al., 2016), but the extent to which common DC was associated with such indicators of parental adjustment remains an open question. When couples are facing daily life stressors, namely stressors originated outside the couple's relationship not directly related to childcare (e.g., changes in close relationships, work-family conflict), common DC strategies become particularly relevant (Zemp et al., 2017). Considering that common DC has been associated with positive individual and dyadic adjustment (Staff, Didymus, & Backhouse, 2017), which, in turn, have been linked to less parenting stress and more parental confidence during the transition to parenthood (e.g., Mazzeschi et al., 2015; Pinto, Figueiredo, Pinheiro, & Canário, 2016), common DC may have as well important implications for parental adjustment. This might be even more the case in dealing with major stressors (such as the birth of a child), as common DC revealed to be the best predictor of relationship adjustment and health in couples coping with another shared major stressor in the context of illness (Rottmann et al., 2015).

In sum, shared concerns about childcare and mutual solidarity within couples appear to be important for couples' satisfaction and confidence in the parental role during the first year postpartum (Nyström & Öhrling, 2004). Common to both the STM and TRRL approaches is that a "we-stress" or communal appraisal ("we are in this together")

would lead couples to become more committed in their relationships, which further creates resources that help to manage stress (e.g., engagement in common DC behaviors). Furthermore, as common DC likely fosters a sense of we-ness, mutual trust and commitment within couples (Bodenmann et al., 2016), this should in turn strengthen a communal orientation toward stress and contribute to relationship maintenance (Afifi et al., 2016), boosting a process of feedback loops. For example, as research on TRRL has shown (Afifi et al., 2018), a stronger communal orientation and more maintenance behaviors were associated with less perceived stress related to the child's diabetes among fathers and mothers, respectively.

Taken the STM and TRRL frameworks together, it is reasonable to assume that the way couples cope together with a shared stressful event like the birth of a child affects the degree to which parents view themselves as more or less confident in their role as parents as well as the stress experienced in their new roles. Additionally, because the main goal of common DC is to reduce partners' shared stress and maintain the well-being of both partners (Bodenmann et al., 2016), it is plausible that one's partner's perception of common DC is associated with one's own parental adjustment (actor effects) and with the parental adjustment of the partner (partner effects).

The present study

Several studies have examined the associations between attachment representations and couples' perceived parenting stress and confidence during the transition to parenthood, with some of them having identified potential dyadic mediators of these relationships. Recent studies conducted in the general population have identified associations between romantic attachment and common DC, as well as between common DC and parent-related variables (e.g., co-parenting). However, by examining these associations in isolation we still lack a comprehensive understanding of the relationships between these variables in an integrative way. In addition, the role of common DC, which has particular relevance during the transition to parenthood, remains overlooked in perinatal research. Because existing evidence supports that common DC is modifiable through tailored interventions (Bodenmann & Shantinath, 2004), examining this dyadic process may have relevant implications for couple-based perinatal prevention strategies.

This study has two main objectives. First, we assess changes in parenting stress and parental confidence from six weeks postpartum to six to nine months postpartum in both mothers and fathers. We expect significant declines in parents' perceived parenting stress and increases in parents' perceived parental confidence over time. We choose to focus on these two components of parental adjustment because they affect several aspects of the family's functioning, with high parenting stress and low parental confidence often contributing to negative early parent-child interactions and impaired cognitive and socio-emotional functioning of the child (Crnic & Low, 2002; Jones & Prinz, 2005). Accordingly, the identification of modifiable factors that may influence these indicators of parents' adjustment would be beneficial not only to promote partners' parental adjustment but also the well being of the whole family. Second, we examine the mediating role of common DC on the longitudinal associations between anxiety and avoidant attachment representations and parental adjustment, accounting for both actor and partner effects. Grounded in the Attachment Diathesis-Stress Process Model (Simpson & Rholes, 2018) and STM (Bodenmann, 2005), we hypothesize that parents with more anxiety or avoidant romantic attachment representations (at mid-pregnancy) will be less likely to engage in common DC (at six weeks postpartum) and therefore will be more likely to experience high levels of parenting stress and low levels of parental confidence (at six to nine months postpartum; see Figure 1). We also expect partner effects between attachment-related anxiety and avoidance and common DC as well as between common DC and parental adjustment. We anticipate stronger associations between attachment-related avoidance and common DC due to the more consistent links found for this dimension in the literature on support-related processes within couples (Collins & Feeney, 2000; Feeney & Collins, 2001; Levesque et al., 2017; Simpson et al., 1992; Simpson et al., 2002). Contrary to the ambivalent attitudes that individuals with more anxious attachment representations of their romantic partners hold toward them, the more consistent lower levels of dependence on and commitment to their partner demonstrated by individuals with more avoidant attachment representations (Mikulincer & Shaver, 2016) allow us to more accurately predict the direction of the association of this dimension with common DC.

Finally, along with the paucity of studies of couples during the transition to parenthood, prior empirical evidence does not provide strong support for gender differences in the proposed mediation models. The link between attachment-related anxiety and avoidance and common DC appears to occur for both genders (Batinic &

Kamenov, 2017), whereas two distinct predictions can be made for the link between common DC and parental adjustment. On the one hand, considering the shared challenges of the early postpartum period, it can be expected that common DC will have similar importance for the parental adjustment of both mothers and fathers (Molgora et al., 2018). On the other hand, the strong sociocultural context regarding gender norms surrounding motherhood and fatherhood may reinforce traditional gender roles after childbirth (Katz-Wise, Priess, & Hyde, 2010; Yavorsky, Dush, & Schoppe-Sullivan, 2015), which could therefore translate into differences regarding the impact of common DC on mothers and fathers. Hence, we do not propose specific hypotheses regarding the role of parental gender in the hypothesized models and adopt an exploratory approach.

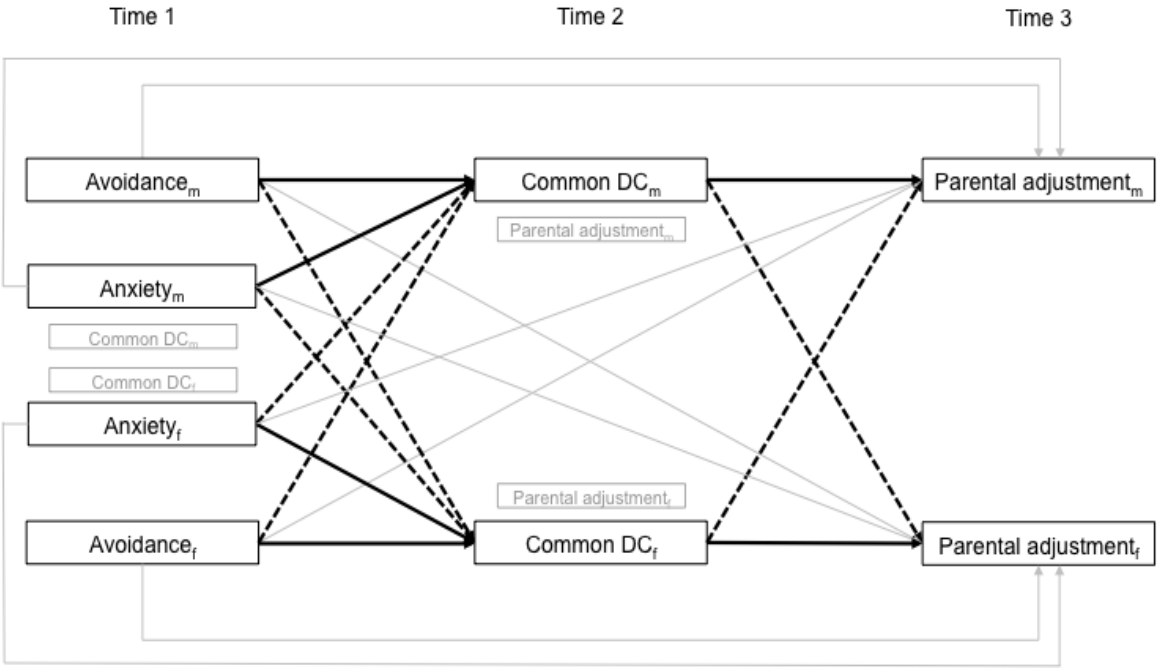

Figure 1 | Conceptual diagram of the proposed actor partner interdependence mediation model

Note. Anxiety and avoidance as independent variables at Time 1, common dyadic coping (Common DC) at Time 2 as mediators, and parental adjustment at Time 3 as dependent variables. Common DC at Time 1 and parental adjustment at Time 2 were included in the model for control purposes. Partners' predictors and error disturbances for the mediators and outcome variables were allowed to covary, but were omitted from the figure for the sake of clarity. Two separate models were conducted for each outcome: parenting stress and parental confidence. Time 1 = second trimester of pregnancy; Time 2 = 6 weeks postpartum; Time 3 = 6-9 months postpartum; m = mothers; f = fathers.

Method

Participants

A total of 92 different-gender couples participated in the study. The majority of couples lived together (married: 70.7%; cohabitating: 26.1%; in a relationship, but not living together: 3.2%) and had a committed relationship for an average of 7.40 years (*SD* = 4.23, range = 11 months – 17 years). Most couples were having their first child (68.5%); couples who had children before this pregnancy had, on average, 1 child (*SD* = 0.41, range = 1 – 3). Mothers' mean age was 31.78 years (*SD* = 4.77, range = 20 – 41), and fathers' mean age was 33.51 years (*SD* = 5.18, range = 20 – 45), with mothers being significantly younger than fathers, $t_{(90)} = -5.04$, $p < .001$, $d = .74$. Sixty-six percent of the mothers and 42.2% of the fathers had a university degree, $\chi^2(2) = 13.93$, $p = .001$, $\varphi_c = 0.28$. Most couples were currently working (mothers: 84.6%; fathers: 90%). Mothers reported prior psychological problems (38.5% vs. 4.4%; $\chi^2(1) = 30.97$, $p < .001$, $\varphi_c = 0.41$) and treatment (27.5% vs. 12.1%; $\chi^2(1) = 6.79$, $p < .01$, $\varphi_c = 0.19$) significantly more often than fathers did. Twenty-one percent of mothers reported prior pregnancy loss, and 9% reported a history of infertility. The majority of pregnancies were planned (88%) and desired (97.8%) and occurred without gestational complications (77.2%). Among the babies (47 male; 45 female), most were born without complications (71.7%).

Procedure

The data collection occurred between November 2015 and September 2017 in the university hospital (blind for review) upon approval by the Research Ethics Committees of the (blind for review) and one university hospital (blind for review). Couples were eligible if (a) the woman was in the second trimester of a singleton pregnancy with no complications with the baby (e.g., fetal anomalies or other medical problems) or other adverse clinical events, (b) couples were formally married, cohabiting or dating, and (3) both partners were at least 18 years old and (4) could read and understand Portuguese.

At the end of an obstetric appointment, eligible women (and their partners, if available) were introduced to the study by their obstetrician and were asked for permission to be contacted by the researchers. After this initial approach, the researchers

provided more information about the study aims and assured the confidentiality of the data. At this time (second trimester of pregnancy – T1), couples willing to participate signed informed consent and were given a copy accompanied by a set of questionnaires to complete at home (clear instructions were given about the need to answer independently of their partners). They were asked to return the questionnaires directly to the researcher at the following obstetrical appointment. The follow-up assessments occurred at 6 weeks (T2) and at the end of six months (T3) postpartum, when the couples were mailed one set of questionnaires for each partner along with a pre-stamped envelope in which to return the questionnaires after completion. Reminder text messages were sent to all couples who did not reply within 2 to 3 weeks at each assessment point. Couples participated voluntarily without receiving money or other compensation for their collaboration.

At T1, we approached 611 women/couples; 52 refused to participate, and 8 failed to meet the inclusion criteria (e.g., not in a romantic relationship). Of the remaining 551 couples, 335 returned questionnaires (participation rate: 60.8%); 303 couples were retained at this time (32 were excluded because the couples did not met the inclusion criteria or the questionnaires were completed only by the women). At T2, we were able to mail questionnaires to 290 couples (5 couples suffered a perinatal loss and we did not have information about the delivery of 8 couples). Data from both partners were obtained from 138 couples (participation rate: 47.6%). All 138 couples (except one couple who demonstrated unwillingness to continue in the study after completion of T2) were contacted at T3; 92 couples returned the questionnaires answered by both partners (participation rate: 67.2%). On average, couples returned the T3 questionnaires when their children were between 6 and 7 months old (78.3%; *M* = 6.83, *SD* = 0.85, range = 5.5 – 9.0)[1].

Measures

The following self-report questionnaires were completed by each partner.

Attachment representations

The Portuguese version (PV) of the Experience in Close Relationships – Relationship Structures (ECR-RS; Fraley, Heffernan, Vicary, & Brumbaugh, 2011; PV: Moreira, Martins, Gouveia, & Canavarro, 2015) was used to assess anxious (3 items; e.g.,

"I often worry that this person doesn't really care for me") and avoidant (6 items; e.g., "I don't feel comfortable opening up to this person") attachment representations at T1. The nine items are rated on a 7-point response scale (1 = *strongly disagree* to 7 = *strongly agree*), with higher scores indicating more anxious or avoidant representations. In the original questionnaire, participants are asked to answer the same nine items for four types of intimate relationships (i.e., with mother, father, romantic partner, and best friend). In this study, only the romantic partner domain was used. In this sample, Cronbach's α for Anxiety was .95 for mothers and .96 for fathers, and for Avoidance was .71 for mothers and .70 for fathers.

Dyadic coping

Participants completed the common DC subscale of the Dyadic Coping Inventory (DCI; Bodenmann, 2008; PV: Vedes, Nussbeck, Bodenmann, Lind, & Ferreira, 2013) at T1 and T2. This was used to assess couple-oriented behaviors in which couples engage to cope jointly with stress. This subscale contains 5 items ("We try to cope with the problem together and search for ascertained solutions", "We engage in a serious discussion about the problem and think through what has to be done", "We help one another to put the problem in perspective and see it in a new light", "We help each other relax with such things like massage, taking a bath together, or listening to music together" and "We are affectionate to each other, make love and try that way to cope with stress") answered on a 5-point response scale ranging from 1 (*very rarely*) to 5 (*very often*). The total score consists of the mean of the 5 items, with a higher score reflecting higher engagement in common DC behaviors. In this sample, Cronbach's α at T1 was .89 for mothers and .84 for fathers, and at T2 was .91 for mothers and .89 for fathers.

Parental adjustment

Parental adjustment was operationalized in terms of parenting stress and parental confidence.

Parenting stress. Participants completed the Parenting Stress Index – Short Form (PSI-SF; Abidin, 1995; PV: Santos, 2011) at T2 and T3. This questionnaire assesses the stress associated with the parenting role (Parental Distress), the child (Difficult Child) and the parent-child relationship (Parent–Child Dysfunctional Interaction). It includes 36 items

(e.g., "I often have the feeling that I cannot handle things very well") answered on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). A global index of parenting stress can be computed through the sum of all items, with higher scores indicating a greater perception of parenting stress. In this study, we only used the total score. In this sample, Cronbach's α at T2 was .93 for mothers and .94 for fathers, and at T3 was .91 for mothers and .93 for fathers.

Parental confidence. Participants completed the Maternal Confidence Questionnaire (MCQ; Badr, 2005; PV: Nazaré, Fonseca, & Canavarro, 2011) at T2 and T3. This instrument was used to assess the overall perceived confidence associated with the parental role, caretaking tasks and knowledge of the infant's needs and motivations. The Portuguese version contains 13 items (e.g., "I know how to take care of my baby better than anyone else") answered on a 5-point response scale ranging from 1 (*never*) to 5 (*always*). The total score of this scale, calculated by computing the mean of the items, was used in this study. Higher scores denote a higher perception of parental confidence. In this sample, Cronbach's α at T2 was .83 for mothers and .88 for fathers, and at T3 was .81 for mothers and .88 for fathers.

Data analysis

Descriptive statistics and bivariate Pearson correlations were computed for the main study variables using IBM SPSS, version 23. Differences between mothers and fathers as well as changes over time were assessed through paired *t* tests. Effect sizes were interpreted as follows: small: $d \geq .20$, $\varphi_c \geq .10$, $r \geq .10$, $R^2 \geq .02$; medium: $d \geq .50$, $\varphi_c \geq .30$, $r \geq .30$, $R^2 \geq .13$; large: $d \geq .80$, $\varphi_c \geq .50$, $r \geq .50$, $R^2 \geq .26$ (Cohen, 1988).

Using Mplus 8 (Muthén & Muthén, 1998-2017), we tested our model with an extended version of the APIM to assess mediation in dyadic data (Ledermann, Macho, & Kenny, 2011; see Figure 1). The APIM allows the simultaneous estimation of the degree to which a person's independent variables influence the *person's own individual* outcome (actor effects) and the degree to which they influence the *partner's* outcomes (partner effects). Actor and partner effects are represented in Figure 1 by solid and dashed black arrows, respectively. Within this approach, the predictor variables of both partners as well as the error disturbances for the mediators and outcome variables are correlated, accounting for the interdependence of both partners' scores within couples (not shown

in Figure 1 to maintain clarity). In this study, dyadic interdependence was estimated through Pearson's bivariate correlations between mothers' and fathers' scores.

In the present study, mediation is evident when the effect of mothers' and fathers' anxiety and/or avoidant attachment representations at T1 on mothers' or fathers' parental adjustment at T3 can be explained by a significant indirect effect via one's own or the partner's common DC at T2. Two models were independently tested for each outcome: parenting stress and parental confidence. Statistically significant direct effects of the independent variables on the outcomes are not necessarily required for mediation (Shrout & Bolger, 2002). In all models, baseline levels of the mediators (common DC at T1) and the outcomes (parental adjustment at T2) were controlled for in the analyses (see Figure 1). Sociodemographic, obstetric and psychological variables significantly associated with the outcome variables were only retained if they significantly contributed to the model. To test for the significance of indirect effects, maximum likelihood bootstrap procedures using 1000 samples were performed (Shrout & Bolger, 2002). This strategy generates 95% bias-corrected and accelerated confidence intervals (BCa CIs) of the indirect effects, which are considered significant if zero does not fall within the lower and upper CIs. Missing data were handled by using Full Information Maximum Likelihood (i.e., parameters were estimated considering all available data) in Mplus.

Following the recommendations of Kenny, Kashy, and Cook (2006), all the independent variables and mediators were centered around the grand mean and unstandardized path coefficients and their standard errors were reported. Because we did not expect specific associations for mothers and fathers, to reduce the models' complexity, we successively constrained the mother's and father's actor effects and the partner effects, respectively, to be equal across genders. If the observed change in model fit (chi-square difference test for nested models; $\Delta\chi^2$) did not decrease significantly, we present the more parsimonious models. In addition, we assessed the overall model fit based on the following criteria: a non-significant chi-square statistic (p >.05), a comparative fit index (CFI) above 0.95, a standardized root-mean-square residual (SRMR) below .08, and a root-mean-square error of approximation (RMSEA) below .05 (Hu & Bentler, 1998). For all analyses, the level of significance was set at p <. 05.

Results

Descriptive Statistics and Correlations

Means, standard deviations, paired *t* tests and intercorrelations for the main study variables are presented in Table 1. The average levels of anxious and avoidant attachment representations were relatively low considering the maximum score of each subscale (= 7), with fathers reporting higher scores on avoidance than mothers, t_{87} = -2.74, p = .007, d = .41. The mean scores of common DC were high (possible range 1 – 5) but decreased significantly over time for both mothers, t_{91} = 2.03, p = .045, d = .30, and fathers, t_{90} = 4.17, p <. 001, d = .61. Levels of parenting stress were relatively low (possible range 36 – 180) and scores of parental confidence were high (possible range 1 – 5), with mothers perceiving themselves as more confident compared to fathers, at both assessment times (T2: t_{89} = 6.34, p <. 001, d = .94; T3: t_{87} = 5.59, p <. 001, d = .83). Mean scores of parenting stress decreased (mothers: t_{91} = 3.82, p <. 001, d = .56; fathers: t_{90} = 1.96, p = .054, d = .29) and mean scores of parental confidence increased (mothers: t_{90} = -6.13, p <. 001, d = .90; fathers: t_{87} = -6.55, p <. 001, d = .98) over time. The intercorrelations between the study variables are presented in Table 1. Significant small to strong correlations were found between partners, underlining the interdependence within couples. We found significant associations between mother's parenting stress at T3 and history of psychiatric/psychological problems (r = .28, p < .01), history of psychiatric/psychological treatment (r = .35, p < .01) and pregnancy complications (r = -.24, p < .05), father's parenting stress at T3 and desired pregnancy (r = -.28, p < .01), and mother's parental confidence at T3 and age (r = -.22, p < .05), education (r = -.34, p < .01) and history of psychiatric/psychological treatment (r = -.21, p < .05).

Table 1 | Descriptive statistics and bivariate correlations between study variables

	Descriptives			Correlations							
	Mothers	Fathers	$Diff_{m-f}$								
	M (*SD*)	*M* (*SD*)	*t*	1	2	3	4	5	6	7	8
1. Anxiety (T1)	2.33 (1.85)	2.60 (2.03)	-1.11	**.27***	.41***	-.27*	-.22*	.42***	.27*	-.30**	-.33**
2. Avoidance (T1)	1.39 (0.63)	1.60 (0.73)	-2.74**	.38***	**.42*****	-.59***	-.61***	.65***	.57***	-.55***	-.60***
3. Common DC (T1)	4.16 (0.68)	4.14 (0.65)	0.36	-.14	-.40***	**.59*****	.68***	-.51***	-.60***	.54***	.53***
4. Common DC (T2)	4.00 (0.79)	3.89 (0.75)	1.32	-.14	-.39***	.55***	**.49*****	-.59***	-.50***	.68***	.52***
5. Parenting stress (T2)	63.29 (17.52)	62.30 (17.80)	0.52	.23*	.44***	-.34**	-.43***	**.47*****	.66***	-.56***	-.38***
6. Parenting stress (T3)	57.82 (13.73)	59.43 (15.96)	-1.14	.21*	.38***	-.38***	-.36***	.65***	**.60*****	-.53***	-.61***
7. Parental confidence (T2)	4.39 (0.37)	4.01 (0.53)	6.34***	-.16	-.22*	.24*	.35**	-.58***	-.37***	**.28****	.75***
8. Parental confidence (T3)	4.54 (0.29)	4.26 (0.47)	5.59***	-.20	-.24*	.26*	.37***	-.44***	-.59***	.74***	**.30****

Note. Correlations for mothers are presented below the diagonal, and for fathers above the diagonal. Correlations within couples are showed in bold on the diagonal. Common DC = common dyadic coping; T1 = second trimester of pregnancy; T2 = 6 weeks postpartum; T3 = 6-9 months postpartum.

* $p < .05$; ** $p < .01$; *** $p < .001$

Mediation analyses

Indirect Effects of Common DC on the Associations between Romantic Attachment Representations and Parenting Stress

Selection of the model. First, we assessed several models to select the most parsimonious one by constraining each pair of actor effects and partner effects, separately, and examining significant changes in the model fit. When we fixed the pair of path coefficients to be equal across genders, model fit did not decrease significantly, except when we equalized the actor effects of common DC at T1 on parenting stress at T3 ($\Delta\chi^2$ = 7.024, Δdf = 1, p = .008) and the partner effects of parenting stress at T2 ($\Delta\chi^2$ = 7.348, Δdf = 1, p = .007) and common DC at T2 ($\Delta\chi^2$ = 3.731, Δdf = 1, p = .053) on parenting stress at T3. In contrast to the findings for mothers (B = -3.40, p = .121), common DC at T1 significantly predicted fathers' parenting stress at T3 (B = -9.43, p < .001). Unlike fathers (B = 0.02, p = .821), mothers' parenting stress at T2 was significantly related to their partner's parenting stress at T3 (B = 0.26, p < .001). Finally, unlike mothers (B = -0.42, p = .789), fathers' common DC at T2 was significantly related to their partner's parenting stress at T3 (B = -4.59, p = .027). Therefore, these three pairs of path coefficients were allowed to vary freely across genders, whereas the remaining paths were fixed as equal for mothers and fathers. Our final model fit the data well: χ^2 = 9.063, df = 19, p = .972; RMSEA = 0.000; SRMR = 0.028; CFI = 1.000.

Direct effects. The paths displayed in Figure 2 show that higher avoidant attachment representations at T1 were associated with a decrease in one's own common DC from T1 to T2 in a model explaining 39% and 50% of the common DC variance for mothers and fathers, respectively (accounting for the baseline levels of common DC). The partner effects between attachment-related avoidance and common DC at T2 were not statistically significant as well as the actor and partner effects between attachment-related anxiety and common DC at T2. The actor effects of common DC at T2 on parenting stress at T3 were not statistically significant, whereas fathers' common DC at T2 significantly predicted declines in mothers' parenting stress from T2 to T3. The independent variables and mediators considered (controlling for the baseline levels of the outcomes) accounted for a high proportion of variance in parenting stress for mothers (47%) and fathers (64%), respectively. In sum, higher attachment-related avoidance at T1

predicted declines in common DC, and father's higher common DC at T2 was a significant predictor of mother's decreases in parenting stress.

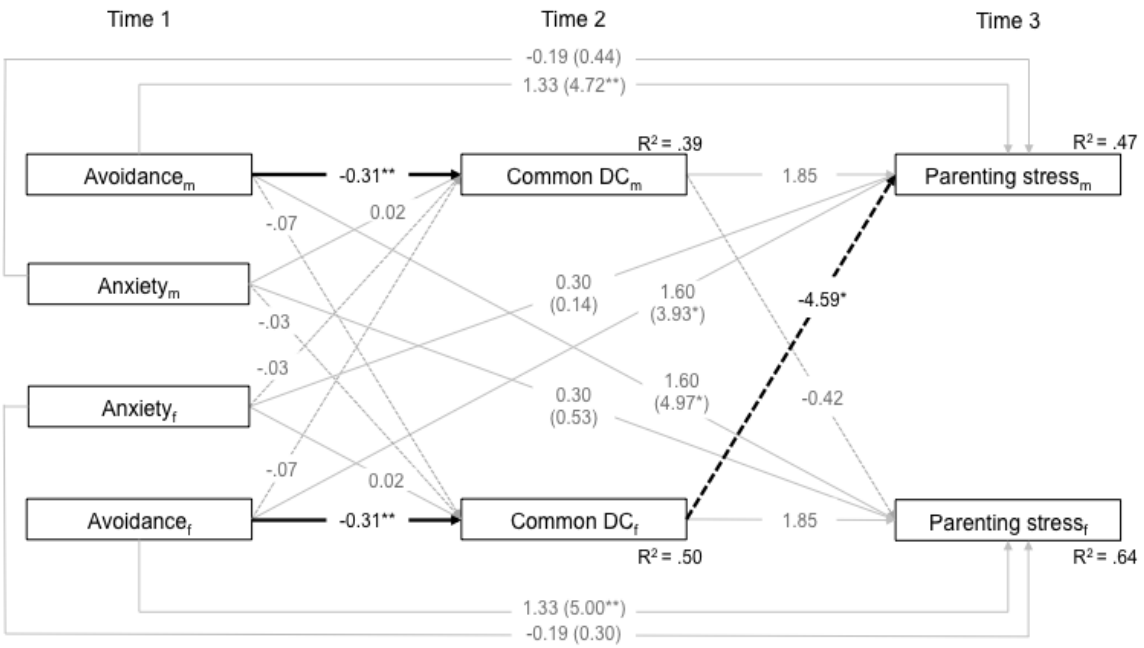

Figure 2 | Statistical diagram of the proposed actor partner interdependence mediation model considering parenting stress as the outcome

Note. Paths values represent unstandardized maximum likelihood estimates. For clarity, the correlations and effects of the covariates (common dyadic coping [Common DC] at Time 1 and parenting stress at Time 2) were omitted. The total effect of anxiety and avoidance on parenting stress at T3 (before inclusion of the mediators) is described in parentheses and the direct effect (after inclusion of the mediators) is represented by the value outside parentheses. Time 1 = second trimester of pregnancy; Time 2 = 6 weeks postpartum; Time 3 = 6-9 months postpartum; m = mothers; f = fathers. * $p < .05$; ** $p < .01$.

Indirect effects. A significant indirect effect of fathers' avoidant attachment representations on mothers' parenting stress via fathers' common DC was observed (see Table 2). This finding suggests that fathers with more avoidant romantic attachment representations (at pregnancy) were less likely to engage in collaborative ways of coping (from pregnancy to 6 weeks postpartum), which, in turn, increased their partner's levels of parenting stress (from 6 weeks to 6-9 months postpartum). The described pattern of mediation was not found for attachment-related anxiety (see Table 3), which did not significantly predict neither the mediators nor the outcomes (total and direct effects).

Table 2 | Indirect Effects of Common Dyadic Coping (Time 2) on the Associations Between Attachment-Related Avoidance (Time 1) and Parental Adjustment (Time 3)

Indirect effect			IE (*SE*)	*p*	95%CI (LLCI/ULCI)
Parenting stress (PS)					
$Avoidance_m$ →	Common DC_m →	PS_m	-0.57 (0.50)	0.259	[-1.95, 0.16]
$Avoidance_f$ →	Common DC_m →	PS_m	-0.14 (0.22)	0.529	[-0.91, 0.11]
$Avoidance_m$ →	Common DC_f →	PS_m	0.34 (0.43)	0.423	[-0.33, 1.40]
$Avoidance_f$ →	**Common DC_f →**	**PS_m**	**1.41 (0.71)**	**0.046**	**[0.33, 3.20]**
$Avoidance_f$ →	Common DC_f →	PS_f	-0.57 (0.50)	0.259	[-1.95, 0.16]
$Avoidance_m$ →	Common DC_f →	PS_f	-0.14 (0.22)	0.529	[-0.91, 0.11]
$Avoidance_f$ →	Common DC_m →	PS_f	0.03 (0.18)	0.860	[-0.19, 0.61]
$Avoidance_m$ →	Common DC_m →	PS_f	0.13 (0.48)	0.788	[-0.88, 1.17]
Parental confidence (PC)					
$Avoidance_m$ →	Common DC_m →	PC_m	0.01 (0.01)	0.512	[-0.01, 0.03]
$Avoidance_f$ →	Common DC_m →	PC_m	0.00 (0.00)	0.621	[-0.00, 0.02]
$Avoidance_m$ →	Common DC_f →	PC_m	-0.01 (0.01)	0.263	[-0.03, 0.00]
$Avoidance_f$ →	**Common DC_f →**	**PC_m**	**-0.03 (0.01)**	**0.033**	**[-0.06, -0.01]**
$Avoidance_f$ →	**Common DC_f →**	**PC_f**	**0.04 (0.02)**	**0.059**	**[0.01, 0.10]**
$Avoidance_m$ →	Common DC_f →	PC_f	0.01 (0.01)	0.361	[-0.01, 0.05]
$Avoidance_f$ →	Common DC_m →	PC_f	-0.01 (0.01)	0.263	[-0.03, 0.00]
$Avoidance_m$ →	**Common DC_m →**	**PC_f**	**-0.03 (0.01)**	**0.033**	**[-0.06, -0.01]**

Note. Unstandardized maximum likelihood estimates for indirect effects (IE) are displayed. Significant IE are in bold. CI = confidence interval; LLCI/ULCI = lower and upper CI; common DC = common dyadic coping; m = mothers; f = fathers.

Table 3 | Indirect Effects of Common Dyadic Coping (Time 2) on the Associations Between Attachment-Related Anxiety (Time 1) and Parental Adjustment (Time 3)

Indirect effect					IE (*SE*)	*p*	95%CI (LLCI/ULCI)
Parenting stress (PS)							
$Anxiety_m$	→	Common DC_m	→	PS_m	0.04 (0.07)	0.612	[-0.04, 0.33]
$Anxiety_f$	→	Common DC_m	→	PS_m	-0.05 (0.07)	0.522	[-0.31, 0.03]
$Anxiety_m$	→	Common DC_f	→	PS_m	0.12 (0.14)	0.399	[-0.09, 0.45]
$Anxiety_f$	→	Common DC_f	→	PS_m	-0.09 (0.15)	0.548	[-0.58, 0.11]
$Anxiety_f$	→	Common DC_f	→	PS_f	0.04 (0.07)	0.612	[-0.04, 0.33]
$Anxiety_m$	→	Common DC_f	→	PS_f	-0.05 (0.07)	0.522	[-0.31, 0.03]
$Anxiety_f$	→	Common DC_m	→	PS_f	0.01 (0.06)	0.853	[-0.07, 0.20]
$Anxiety_m$	→	Common DC_m	→	PS_f	-0.01 (0.05)	0.878	[-0.23, 0.06]
Parental confidence (PC)							
$Anxiety_m$	→	Common DC_m	→	PC_m	0.00 (0.00)	0.709	[-0.01, 0.00]
$Anxiety_f$	→	Common DC_m	→	PC_m	0.00 (0.00)	0.686	[-0.00, 0.01]
$Anxiety_m$	→	Common DC_f	→	PC_m	-0.00 (0.00)	0.312	[-0.01, 0.00]
$Anxiety_f$	→	Common DC_f	→	PC_m	0.00 (0.00)	0.475	[-0.00, 0.01]
$Anxiety_f$	→	Common DC_f	→	PC_f	-0.00 (0.01)	0.524	[-0.02, 0.00]
$Anxiety_m$	→	Common DC_f	→	PC_f	0.00 (0.00)	0.389	[-0.00, 0.02]
$Anxiety_f$	→	Common DC_m	→	PC_f	-0.00 (0.00)	0.312	[-0.01, 0.00]
$Anxiety_m$	→	Common DC_m	→	PC_f	0.00 (0.00)	0.475	[-0.00, 0.01]

Note. Unstandardized maximum likelihood estimates for indirect effects (IE) are displayed. CI = confidence interval; LLCI/ULCI = lower and upper CI; common DC = common dyadic coping; m = mothers; f = fathers.

Indirect Effects of Common DC on the Associations between Romantic Attachment Representations and Parental Confidence

Selection of the model. We replicated the steps above to identify the best-fitting model regarding parental confidence. All paths could be equalized across gender without significant declines in model fit, with the exception of three pairs of paths: the actor paths between common DC at T2 and parental confidence at T3 ($\Delta\chi^2 = 4.071$, $\Delta df = 1$, $p = .044$) and between avoidant attachment representations and the outcome ($\Delta\chi^2 = 8.353$, $\Delta df = 1$, $p = .004$) as well as the partner paths between avoidant attachment representations

and parental confidence at T2 ($\Delta\chi^2$ = 14.699, Δdf = 1, p < .001). In contrast to the findings for mothers (B = -0.02, p = .506), common DC at T2 significantly predicted fathers' parental confidence at T3 (B = -0.14, p = .033). Avoidant attachment representations were significantly associated with fathers' parental confidence at T3 (B = -0.17, p = .004), but not with mothers' parental confidence (B = 0.01, p = .798). Finally, fathers' avoidant attachment representations were positively associated with mothers' parental confidence at T2 (B = 0.14, p = .026), whereas mothers' avoidant attachment representations were negatively associated with fathers' parental confidence at T2 (B = -0.15, p = .022). Therefore, these three pairs of paths were allowed to vary freely across gender, whereas the remaining paths were fixed to be equal for mothers and fathers. The final model fit the data well: χ^2 = 16.466, df = 19, p = .626; RMSEA = 0.000; SRMR = 0.071; CFI = 1.000.

Direct effects. Figure 3 replicates the significant and negative actor effects between avoidant attachment representations and common DC at T2 as well as the non-significant actor and partner effects between the variables described in our first model (namely regarding attachment-related anxiety). Taking into account the covariates included in the model (baseline levels of common DC), the explained variance in common DC at T2 was relatively high (mothers: 38%; fathers: 49%). As previously stated, the actor effects of common DC at T2 on parental confidence at T3 were only significant for fathers, suggesting that higher engagement in common DC reduced fathers' own parental confidence from T2 to T3. The partner effects of common DC were significant and positive, indicating that for both mothers and fathers, the more engaged they were in common DC, the more confident their partners felt as parents in the long term. The final model (accounting for the baseline levels of the outcomes) explained a high proportion of variance in parental confidence (mothers: 67%; fathers: 59%). In sum, higher attachment-related avoidance at T1 predicted declines in common DC, the actor effects of common DC were significant for fathers (predicting declines in parental confidence) and the partner effects of common DC were significant for both parents (predicting increases in parental confidence).

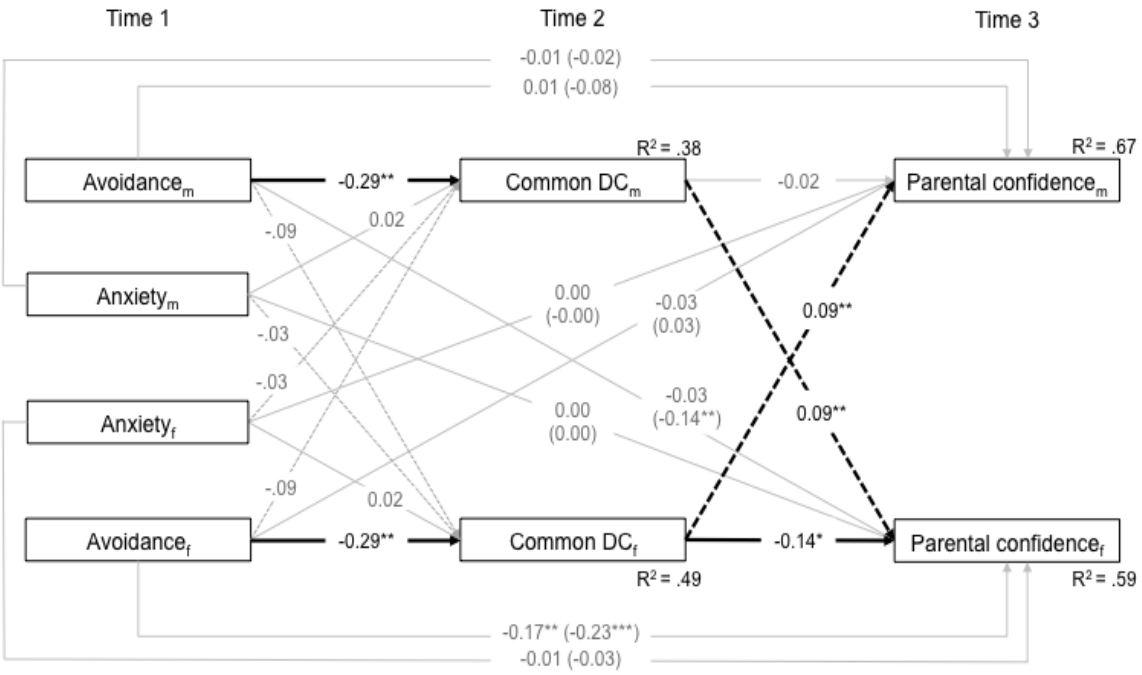

Figure 3 | Statistical diagram of the proposed actor partner interdependence mediation model considering parental confidence as the outcome

Note. Paths values represent unstandardized maximum likelihood estimates. For clarity, the correlations and effects of the covariates (common dyadic coping [Common DC] at Time 1 and parental confidence at Time 2) were omitted. The total effect of anxiety and avoidance on parental confidence at T3 (before inclusion of the mediators) is described in parentheses and the direct effect (after inclusion of the mediators) is represented by the value outside parentheses. Time 1 = second trimester of pregnancy; Time 2 = 6 weeks postpartum; Time 3 = 6-9 months postpartum; m = mothers; f = fathers. * $p < .05$; ** $p < .01$; *** $p < .001$.

Indirect effects. As presented in Table 2, we found a significant indirect partner effect of one's own avoidant attachment representations on the partner's parental confidence via one's own common DC. This finding suggests that both mothers and fathers who reported more avoidant attachment representations were significantly less likely to engage in common DC over time, and less engagement in common DC predicted declines in the partner's parental confidence. Additionally, the within-person mediation found for fathers showed that fathers with more avoidant attachment representations engaged less in common DC and, consequently, reported significant increases in their parental confidence. Concerning the role of attachment-related anxiety, there was no evidence of mediation (see Table 3), neither for significant total nor for direct effects (see Figure 3)[2, 3].

Discussion

This prospective longitudinal study examined the changes in both mothers' and fathers' parental adjustment over time and the mediating role of common DC on the associations between anxious and avoidant attachment representations and parenting stress and parental confidence. The main findings of this study generally confirmed our two hypotheses: (a) perceived parenting stress declined and perceived parental confidence increased across the first year postpartum, and (b) parents with higher avoidant (but not anxious) attachment representations at mid-pregnancy engaged less in common DC from pregnancy to 6 weeks postpartum, which increased their partners' parenting stress (only in mothers) and decreased their partners' parental confidence (in both parents).

Overall, the parents in this study appeared to be generally well adjusted to their parenting role and showed low stress and good confidence in their parenting skills, particularly between six and nine months postpartum. This may be because the sample consisted of low-risk couples, and prior research shows that parents tend to experience less stress (Vismara et al., 2016) and feel more competent (Biehle & Mickelson, 2011; Hudson et al., 2001) in parenting over time.

The mediational models showed that the partner's perception of common DC at six weeks postpartum accounted for the influence of one's own romantic avoidant attachment representations at mid-pregnancy on the partner's parental adjustment at six to nine months postpartum. Regarding the first path of our model, in line with our expectations and prior findings (Batinic & Kamenov, 2017; Levesque et al., 2017), parents with more avoidant romantic attachment representations were less likely to engage in joint coping efforts. However, contrary to the anticipated partner effects, we found only actor effects, indicating that each partner's perception of common DC depends more on his or her own rather than the partner's avoidant attachment representations. This finding might suggest that the impact of the other's attachment representations do not work exclusively but may depend on other factors, such as one's own (more or less) secure attachment representations, an interaction effect that has previously been demonstrated in studies conducted with couples (Mikulincer & Shaver, 2016). The weaker associations between attachment-related anxiety and common DC compared to the associations between avoidance and common DC were as hypothesized and possibly reflect the ambivalent attitudes that individuals with more anxious representations of their romantic

partners hold toward them (Mikulincer & Shaver, 2016). On the one hand, when both partners face a shared stressor, higher engagement in couple-oriented behaviors (i.e., those that promote the desired proximity) may be expected; on the other hand, their self-focus and doubts about the partner's availability may constrain individuals to engage in a symmetrically or complementary process of coping (i.e., helping each other to reduce stress or resolving the problem jointly). As a result, it could be difficult to establish a consistent and predictable pattern of behaviors. A similar line of thinking could justify why, in our study, mothers and fathers' attachment anxiety was not directly associated with their parenting stress or parental confidence, despite opposing evidence found in previous studies (e.g., Howard, 2010; Mazzeschi et al., 2015). Alternatively, because of the low-risk sample of this study and the increased proximity and interdependence between partners that arise during the course of a pregnancy (Cowan & Cowan, 2000) (and that individuals with more anxious representations desire in romantic relationships), it could be possible that, on average, these individuals might not have perceived the multiple demands of pregnancy as particularly distressing. In such circumstances, attachment concerns are less likely to become activated and, consequently, to influence individuals' appraisals, behaviors and emotions.

Regarding the second path of our model, lower engagement in common DC seemed to account for increases in parenting stress and declines in parental confidence, as expected, but in an interactive way. That is, with regard to parenting stress, the more *fathers* had avoidant attachment representations, the less *they* engaged in common DC and, consequently, the more parenting stress the *mothers* perceived. We did not find similar effects for fathers' parenting stress, which suggests differences within couples regarding the role of joint coping efforts on perceived parenting stress. This finding could reflect the sociocultural context present in many westernized countries (including in Portugal), in which a high proportion of families are full time dual-earners (Matias, Andrade, & Fontaine, 2012; Yavorsky et al., 2015) and changes towards father's participation in childcare and family life are increasing (Cabrera, Volling, & Barr, 2018; Wall et al., 2017), but mothers remain the primary caregivers and are more often responsible for infant care and household tasks than fathers (Matias et al., 2012; Yavorsky et al., 2015). Joint handling of everyday stressors most likely reduces mothers' greater family and household responsibilities and hence attenuates the maternal strain often associated with childcare (Nyström & Öhrling, 2004). Perhaps for these reasons, for mothers with

partners with more avoidant attachment representations, motherhood may be perceived as particularly stressful because their partners engage less in common DC. While previous studies conducted with families with type I diabetes showed that feeling communally oriented toward one's partner reduced fathers' but not mothers' perceived parenting stress (Afifi et al., 2018), for women transitioning to first- or second-time parenthood, a communal approach to stressors (at least at the behavioral level) seems to play an important role. This explanation may also account for why these mothers also feel less confident in their role.

We found that less common DC perceived by mothers with more avoidant attachment representations played a crucial role in fathers' parental confidence. The importance of feeling confident as a parent during the first year postpartum has been described by both mothers and fathers (Nyström & Öhrling, 2004). However, mothers feel generally more confidence compared to fathers, a result that our study replicated and that can also be explained by their greater involvement in child care (Biehle & Mickelson, 2011; Hudson et al., 2001). This is consonant with the larger societal norms and expectations around the roles of mothers and fathers (Cabrera et al., 2018). Accordingly, mothers are socialized to assume a predominant caring role, while fathers are mostly the support provider (Katz-Wise et al., 2010; Yavorsky et al., 2015). Hence, the role allocation is likely to exclude fathers from many of the relevant concerns surrounding family life – particularly childcare. Our findings suggest that when mothers are willing to engage in collaborative strategies when dealing with daily demands, fathers become more involved in the family's everyday concerns and are perhaps better equipped to manage their insecurities. Fathers might feel that they are "part of a team", which has been shown to be of particular relevance for fathers of young children (Afifi et al., 2018). Consequently, this should fosters their own sense of competence in their parenting skills. This reasoning is supported by previous studies demonstrating that fathers' greater involvement in childcare activities and perceptions of their partner's support of their parenting were associated with higher paternal parenting efficacy at 6 months postpartum (Leerkes & Burney, 2007) as well as greater paternal parenting satisfaction at 9 months postpartum (Schoppe-Sullivan et al., 2016), respectively.

Our findings suggest that a strong motivation to avoid emotional closeness and cohesion (high avoidance) produces challenges for engagement in common DC, putting both mothers and fathers at high risk for less perceived confidence as parents in the long

term. Interestingly, the indirect effects between avoidant attachment representations and parental adjustment via common DC emerged across partners, suggesting the presence of crossover effects within couples (i.e., the negative experiences of one partner affect the other partner; Westman, 2011) while simultaneously controlling for within-person effects. The stronger impact of partner effects above actor effects supports the salient interdependence within Portuguese couples in general (Vedes et al., 2016) and, in particular, the "we-experience" nature of the period following the birth of a child.

Finally, a somewhat surprising result was the within-person mediation found for fathers, which challenged our earlier interpretation. We found that fathers with more avoidant attachment representations engaged less in common DC, which, in turn, increased their own parental confidence. This is an unexpected result and should be interpreted with caution because the bivariate correlations show the inverse link. Nevertheless, this finding seems to be associated with the tendency towards more traditional gender roles after the birth of a child, previously addressed. Fathers' engagement in more or less complementary roles regarding support provision may conflict with societal beliefs surrounding fatherhood: fathers are still viewed as the support providers and women as the support recipients (Brown, 1986; Rehel, 2013) and they generally assume a "protector role" towards women (Darwin et al., 2017), self-disclosing less needs of support to their partners than women (Cowan & Cowan, 2000; Levy-Shiff, 1999). Accordingly, fathers may see engagement in common DC as a sign of their incompetence in managing demanding situations independently, as suggested in prior studies with Latino couples (Falconier, Nussbeck, & Bodenmann, 2013). The centrality of the breadwinner role still present for many fathers (Kazmierczak & Karasiewicz, 2018), including for some Portuguese men (Matias et al., 2012; Vedes et al., 2016), supports this line of thought. As a result, engaging in less common DC might lead to a sense of "I can handle potential stressors if my partner is not available", which consequently could strengthen the extent to which they feel confident in undertaking their parenting chores. On a related note, it may be that fathers with more avoidant attachment representations perceive common DC as undesirable since they value independence and distance from their partner and consequently benefit *more* (in terms of perceived parental confidence) by engaging *less* in common DC. Additional research is warranted to both replicate and fully understand these findings.

Strengths and Limitations

This study contributes to existing perinatal research by providing an initial understanding of the unexplored links between romantic attachment and common DC as well as between this dyadic process and parenting stress and parental confidence. Specifically, examining the relationships between these variables together in a mediational model provides a comprehensive picture of potential mechanisms explaining the effects of romantic attachment avoidance on early parental adjustment and thus adds evidence to the Attachment Diathesis-Stress Process Model (Simpson & Rholes, 2018). Other important strengths of this study are its prospective longitudinal design, which allowed examining one possible way in which attachment and dyadic processes may operate together to influence couples' adjustment in the long-term. Importantly, it considered the nonindependence of the observations over time, by controlling for the scores of the variables assessed at previous times, which allowed obtaining rigorous estimates. The consideration of the couple as the unit of analysis, which models the interdependence within couples, was particularly important because the indirect effects tested in this study occurred especially across partners rather than within persons and support the relevance of including both parents in attachment and parenting research (Jones et al., 2015).

The limitations of this study included the use of self-report questionnaires only, which are susceptible to shared method variance. However, this limitation was partly addressed by the APIM approach undertaken (i.e., the partner's scores were used to predict individuals' outcomes). Concerns also arise regarding the validity of self-report questionnaires. Because they assess subjective perceptions regarding interactions with the romantic partner and the child, despite its importance, they are sometimes inaccurate and do not always relate to more objective records (e.g., Jones & Prinz, 2005; Yavorsky et al., 2015). This potential lack of accuracy could be an additional reason for the unexpected association between fathers' common DC and their parental confidence (e.g., given the expected role of fathers as the breadwinner, they may be less accurate in assessing their engagement in common DC as well as their own knowledge and abilities concerning childcare, whose perceptions are likely to align with fatherhood ideologies). It would be interesting to replicate this study with experimental/observational methods, including biomarkers of parenting stress. Likewise, including measures that assess gender role attitudes would allow further research to test the explanations that we advanced for the obtained gender differences. Additionally, attachment was only assessed during pregnancy;

however, because attachment representations tend to be relatively stable across the first two years of parenthood (Stern et al., 2018), our findings are valuable indicators. Another limitation was the reduced sample size and high proportion of dropout, which may have reduced the power to detect small to moderate effects in complex models (e.g., for attachment-related anxiety dimension). This can be explained by the lack of financial compensation for participation and the dyadic nature of the study, which required willingness to participate from both partners. Additionally, because partners with higher engagement in common DC at baseline were those who participated for a longer time, this limited the generalizability of our findings to couples with better common DC strategies.

However, lower retention rates in longitudinal studies and sampling bias are current methodological concerns in dyadic research, in which couples with positive relationships are more willing to participate. In future studies, researchers should make efforts to improve the participation of a larger and more diverse sample of couples, for example, by reinforcing confidentiality issues, maintaining contact with each partner, conducting separate data collection interviews and through diverse settings, as well as normalizing marital conflicts and challenges (Wittenborn, Dolbin-MacNab, & Keiley, 2013). The replication of this study with couples exposed to different types and degrees of stress (e.g., couples facing high-risk pregnancies) also constitutes a direction for future research. Moreover, although our model assumed that romantic attachment led to common DC, which, in turn, led to parenting stress and parental confidence, the possibility of alternative models (e.g., parental adjustment acting as a mediator between romantic attachment and common DC) should be considered. The causal paths among these variables are likely to be bidirectional, influencing each other over time, and future studies would shed some light on other plausible causal influences.

Conclusions and Practical Implications

More avoidant attachment representations of the other partner constrain the use of adaptive collaborative ways of coping in couples dealing with early parenthood-related stressors, which impacts both partners' parental adjustment. By identifying modifiable targets through which more avoidant attachment representations influence parents' adjustment, such as less engagement in common DC, it is possible to inform perinatal prevention strategies with concrete targets in a couple's relationship. Thus, the

assessment of romantic attachment dynamics should be integrated into existing perinatal screening procedures to identify the mothers *and fathers* who could benefit most from common DC-enhancing interventions. Health professionals who provide training in collaborative ways to address parental stress together as a couple (e.g., by strengthening couples' DC skills) may have to use specific strategies to support couples in which one of the partners has avoidant attachment representations. Moreover, our results highlight the importance of paying attention to each partner's cultural beliefs and values around parenting, since a differential impact emerges regarding the role of common DC on fathers' parental confidence as a function of their own and of their spouses' perceptions of common DC.

Notes

1. We compared couples who completed the three assessment points and those who did not, with regard to sociodemographic and obstetric data as well as baseline common DC and attachment-related avoidance and anxiety. Fathers from couples who participated at all assessment times were less likely to have prior children (before this pregnancy), $\chi^2(1) = 4.64$, $p = .031$, $\varphi_c = 0.13$. For mothers, we found that those who dropped out had significantly more pregnancy complications ($\chi^2(1) = 7.58$, $p = .006$, $\varphi_c = 0.16$), and less frequent planned pregnancy ($\chi^2(1) = 6.19$, $p = .013$, $\varphi_c = 0.15$) than those who completed the study. Mothers and fathers from couples who participated at all assessments reported significantly higher scores on common DC at T1 (mothers: $t_{287} = 3.16$, $p = .001$, $d = .41$; fathers: $t_{285} = 3.94$, $p <. 001$, $d = .50$) than mothers and fathers who did not complete the study. No significant differences were found in the remaining variables.

2. We recalculated the mediational models using data of all couples retained at T2 ($N = 138$). The direction, sizes and significance of the direct and indirect effects did not change.

3. We tested whether the mediational models yielded different results when controlling for potential covariates (i.e., age, education, desired pregnancy, pregnancy complications, history of psychiatric/psychological problems and history of psychiatric/psychological treatment). The analyses yielded similar results.

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Empirical study VI

Intra-couple similarity in dyadic coping and partners' adjustment to the birth of a child

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Intra-couple similarity in dyadic coping and partners' adjustment to the birth of a child

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Abstract

Unlike individual perceptions of a couple's functioning, couple-level protective factors against poor adjustment to the birth of a child have rarely been studied. This study examined similarity or reciprocal exchanges in dyadic coping (DC) during pregnancy (T1) and at 6 weeks postpartum (T2) and its effects on both partners' adjustment at 6-9 months postpartum (T3). Ninety-two Portuguese couples provided data on DC, internalizing symptoms, dyadic adjustment and parenting stress. One partner's perceived similarity at T2 negatively predicted the other partner's internalizing symptoms and parenting stress. An individual's perceived similarity at T1 positively predicted his or her own internalizing symptoms. These associations controlled for stereotype effects. Both partners' adjustment seems to benefit from unique similarity within the couple after childbirth, while complementarity in DC during pregnancy appears to be more beneficial in the long term. Our findings suggest important refinements to DC-based interventions already aimed to promote similarity in DC.

Keywords: Similarity; Dyadic coping; Couples; Transition to parenthood; Adjustment.

Introduction

The transition to (first- or second-time) parenthood is a normative yet vulnerable and potentially stressful life situation (Cowan & Cowan, 2000; Nyström & Öhrling, 2004) that both members of a couple must manage as individuals and as a unit (dyadic stress; Bodenmann, 2005). The way that couples adapt to this period in terms of emotional, dyadic and parental outcomes has been widely studied (e.g., Lawrence, Rothman, Cobb, Rothman, & Bradbury, 2008; Vismara et al., 2016) and has stimulated a large body of research targeting protective couple-related factors (e.g., partner support; Molgora, Fenaroli, Saita, & Acquati, 2018; Pilkington, Milne, Cairns, Lewis, & Whelan, 2015; Schoppe-Sullivan, Settle, Lee, & Dush, 2016).

Existing studies that have focused on the role of the couple's relationship during the transition to parenthood have privileged an individual approach (Mickelson & Biehle, 2017), mostly considering the woman's perspective and adjustment (Pilkington et al., 2015). A couple-based approach that considers the couple as the unit of analysis, including both self and partner characteristics simultaneously, has been the focus of recent studies (e.g., Blind for review, 2018ab; Molgora et al., 2018; Schoppe-Sullivan et al., 2016), some of which have examined the influence of couple-level factors on partners' adjustment (e.g., couples' congruence in marital relationship quality; Gameiro, Nazaré, Fonseca, Moura-Ramos, & Canavarro, 2011).

In line with the relevant contributions of the broader couple literature (e.g., studies that document the benefits of reciprocity in support; Bar-Kalifa, Pshedetzky-Shochat, Rafaeli, & Gleason, 2017; Iafrate, Bertoni, Margola, Cigoli, & Acitelli, 2012) and increased interdependence between partners during the transition to parenthood (Cowan & Cowan, 2000; Perry-Jenkins & Claxton, 2011), more research is needed with regard to the interplay between partners during this specific period of life (Mickelson & Biehle, 2017). Considering the couple rather than the individual partner as the unit of analysis, the present study focused on the degree to which partners are more or less similar in the way they engage in behaviors to help the other partner cope with stress (i.e., dyadic coping [DC]) early in the transition to parenthood and whether this may affect both partners' adjustment in the long term.

Intra-Couple Similarity in Dyadic Coping

Dyadic coping is the core concept of the systemic-transactional model (STM; Bodenmann, 2005), which views stress and coping as a dyadic phenomenon: one partner's stress always affects both partners ("we-stress"), and consequently, their coping efforts are intertwined (Bodenmann, Falconier, & Randall, 2017). The STM can be easily extended to the transition to parenthood, because the changes and concerns that accompany this period (e.g., relationship adjustments, negotiation of parenting responsibilities, less social contact and leisure time; Cowan & Cowan, 2000; St John, Cameron, & McVeigh, 2005) are generally couple experiences. Consequently, it is possible to activate DC, which refers to a shared process of coping that starts when one or both partners communicate stress. After decoding and interpreting the partner's signs of stress, the other partner can non-respond, assist the other partner in his/her coping efforts, such as giving helpful advice and showing empathy and solidarity with the partner (i.e., emotion- and problem-focused supportive DC), take over tasks and responsibilities to relieve his/her partner's stress upon request (i.e., delegated DC), or engage in negative DC behaviors (e.g., expressing disinterest or minimizing the partner's stress). In addition, both partners can engage in joint coping efforts (i.e., common DC) when facing a shared stressor. In this study, we focused on the behaviors enacted by one partner to help the other dealing with stress (i.e., supportive, delegated and negative partner-oriented behaviors).

As a couple-based phenomenon, intra-couple similarity within the context of DC, specifically regarding partner-oriented behaviors, has been recently explored and conceptualized as follows (Iafrate, Bertoni, Donato, & Finkenauer, 2012; Iafrate, Bertoni, Margola, et al., 2012): *perceived similarity in DC*, which refers to the congruence between one partner's perception of what he/she provides to the other with his/her own perception of what he/she receives from the other in terms of support in times of stress (this dimension reflects perceptions of reciprocity or equitable exchanges of support within the couple); *actual similarity in providing support*, defined as the congruence between both partners' self- perceptions of their own coping response to the other's stress signals; and *actual similarity in receiving support,* conceptualized as the congruence between both partners' self-perceptions of the other partner's propensity (or non-propensity) to engage in DC.

According to equity theory (Hatfield, Rapson, & Aumer-Ryan, 2008; Walster, Walster, & Berscheid, 1978), an equitable relationship (e.g., where support is mutual between partners) is an important request of high-quality or more satisfied close relationships. In support of this, past research conducted with couples showed that receiving support from the partner without providing him/her support (overbenefit in equity terms) may yield adverse psychological outcomes (e.g., Bar-Kalifa et al., 2017; Gleason, Lida, Bolger, & Shrout, 2003). Similarly, the social projection model of perceived partner responsiveness (Lemay, Clark, & Feeney, 2007) posits that individuals tend to perceive their partner's provision of support as similar to their own support provided (i.e., projection of one's own responsiveness onto the other), which results in the perception of a mutually supportive relationship. Projected responsiveness has shown to enhance the perceiver's satisfaction with the relationship (Lemay et al., 2007) as well as his or her engagement in relationship promotion behaviors (e.g., evaluating a partner positively, providing support; Lemay & Clark, 2008). In addition, perceiving the partner as similar to the self may promote a sense of cognitive and emotional connection between partners, foster feelings of being understood and, in turn, reduce conflicts and enhance relationship satisfaction in both partners (Murray, Holmes, Bellavia, Griffin, & Dolderman, 2002).

Grounded on these theoretical frameworks and the assumption that DC is a form of reciprocal giving and receiving by nature (Bodenmann & Shantinath, 2004), it could be argued that engaging in (or at least perceiving) similar partner-oriented behaviors when dealing with the other's stress may help to preserve a perception of equity in the couple's relationship, promote feelings of mutual trust between partners and have a positive impact on well-being. Congruence/reciprocity between both partners' appraisals of the support they provide and receive from one another (DC) has proven to be positively associated with a couple's relationship quality (Bodenmann, Meuwly, & Kayser, 2011), while inconsistent findings have been found for perceived similarity (i.e., significant and non-significant positive associations; Iafrate, Bertoni, Donato, et al., 2012; Iafrate, Bertoni, Margola, et al., 2012). However, the results of these studies are limited because they do not control for individual main effects (i.e., the elements used to calculate the similarity indexes) and do not adopt a longitudinal approach, which does not allow us to draw solid inferences about the direction of the similarity effects. More recently, in a longitudinal study with Italian couples, Donato et al. (2015) observed that changes in individual

perceptions of one's own and the other's supportive DC behaviors are interconnected (which can be understood in the scope of perceived similarity) and together are an important predictor of relationship satisfaction. Considering that a couple's relationship quality has been found to be associated with several indicators of individual (Whisman & Baucom, 2012) and parental (Grych, 2002) adjustment, it could be reasoned that more or less similar DC exchanges may also have important implications at the individual and parental levels. For instance, research shows that equity of high support received and provided within the couple positively influences positive and negative affect (Bar-Kalifa et al., 2017; Gleason et al., 2003).

Intra-Couple Similarity During the Transition to Parenthood

The birth of a child often contributes to more traditional gender roles (Katz-Wise, Priess, & Hyde, 2010; Perales, Jarallah, & Baxter, 2018), with men assuming a "protector role" towards women and the relationship (support provider) and women being more likely to self-disclose needs and requests for support than men (support receiver) (Darwin et al., 2017; Levy-Shiff, 1999; Rehel, 2013). However, with socio-cultural changes around the conception of fatherhood, fathers have become more involved in childcare (Cabrera, Volling, & Barr, 2018), and feeling supported by their partners in their new role as a father seems to play an important role in their adjustment after the birth of a child (e.g., Schoppe-Sullivan et al., 2016). In Portugal, as in many other countries, individuals are facing ambivalent positions regarding gender roles (Matias, Andrade, & Fontaine, 2012; Ramos, Atalaia, & Cunha, 2016; Vedes et al., 2016). Women are more likely to assume the majority of household and childcare tasks (traditional roles) (Matias et al., 2012; Ramos et al., 2016), although there is a high prevalence of full-time dual-earner parents and a high percentage of fathers who use and value longer paternity leave (egalitarian roles) (Escobedo & Wall, 2015; Matias et al., 2012; Wall & Leitão, 2017).

Thus, the transition to parenthood may currently be experienced more similarly than differently within couples (Dribe & Stanfors, 2009). Indeed, some concerns that were previously gender-specific may currently be reported by both women and men (e.g., how to balance work and childrearing responsibilities; Crespi & Ruspini, 2015). Accordingly, the role of partner support could no longer be examined within the traditional mother-centered approach, as both partners can be the provider and recipient of support (Don & Mickelson, 2012; Ryon & Gleason, 2018).

An important domain of couple's similarity that has received considerable attention in the context of the transition to parenthood is the equity and perceived fairness in the division of household labor and childcare tasks (e.g., Chong & Mickelson, 2016; Newkirk, Perry- Jenkins, & Sayer, 2017), whose benefits have been acknowledged (e.g., Chong & Mickelson, 2016; DeMaris & Mahoney, 2017; Dew & Wilcox, 2011). This assumption of equity in the couple's relationship seems to be of particular importance in the perinatal context nowadays and is likely to extend to the broader daily life of couples transitioning to parenthood (i.e., when couples need to manage daily hassles). As previously noted, this transition is marked by several perinatal stressors not necessarily related to childcare and households (e.g., complicated schedules and time demands, potential disagreements with family of origin, work-family conflict), which are likely to trigger DC strategies. Indeed, DC is principally activated in situations of external stress (i.e., outside the couple's relationship), and recent studies showed its benefits for both partner's individual (Blind for review, 2018a), dyadic (Molgora et al., 2018) and parental (Blind for review, 2018b) adjustment during pregnancy and after childbirth. Extending these findings, perceived and/or actual similarity in DC may also play an important role for partner's adjustment. For instance, if the couple shows (or at least one partner perceives) some degree of imbalance in DC efforts, this could suggest relationship strains such as reduced closeness and commitment, factors that assume particular relevance during this transition (Pilkington et al., 2015). This assumption is supported by existing studies that demonstrated that reciprocal emotional support between partners making the transition to parenthood may have positive consequences for both partners' negative mood and marital satisfaction (Ryon & Gleason, 2018) as well as for the maintenance of the couple's relationship (Hohmann-Marriott, 2009). However, while these studies assessed partners' emotional supportive behaviors in its broadest sense, the specificities of DC (i.e., problem- and emotion-focused strategies to help the partner in his or her coping efforts) remain to be addressed.

The present study

The present study offers a preliminary understanding of the contribution of similarity in DC on both partners' adjustment, considering the specificities of the transition to parenthood's context. The aims of this study were to a) assess intra-couple similarity (i.e., each partner's perceived similarity and couples' actual similarity) in DC behaviors

during pregnancy (T1) and at 6 weeks postpartum (T2) and b) examine the effects of intra-couple similarity regarding these processes at T1 and T2 on each partner's individual, relational and parental adjustment at 6-9 months postpartum (T3), considering actor (i.e., the degree to which a person's perceived similarity in DC influences that person's outcome) and partner (i.e., the degree to which a person's partner's perceived similarity in DC influences that person's outcome) effects (see Figure 1). We choose to assess similarity in DC at T1 and T2 because we were interested in examining whether its effects varied depending of the phase of the transition: T1, a period particularly centered on mothers and of relatively minor changes for the couple and T2, a period of acute stress and multiple reorganizations for both members of the couple. In order to establish the temporal precedence of similarity effects, we focused on partners' adjustment at T3, which is expected to be a relatively normative/stable period (after the months of parental leave) but can also be marked by persistent adjustment difficulties (Vliegen, Casalin, & Luyten, 2014). We simultaneously considered both perceived and actual similarity to compare the extent to which partners' adjustment depends more on subjective or objective similarity in DC (i.e., will it be more important for partners *perceiving* that they are similar in their DC behaviors or actually *being* similar?). It appears that individuals are motivated to perceive their partners DC responses as similar to their own responses regardless of whether they actually are similar (e.g., Donato et al., 2015), and that actual similarity is not sufficient to feel truly understood by one another (Murray et al., 2002). Moreover, past dyadic research has reached a degree of consensus in highlighting the more salient influence of perceived vs. actual similarity in DC and conflict management on relational outcomes (e.g., Acitelli, Douvan, & Veroff, 1993; Iafrate, Bertoni, Margola, et al., 2012).

An important concern that arises when examining a couple's similarity is the need to address stereotype or normativeness effects (Furr, 2008; Kenny & Acitelli, 1994; Kenny, Kashy, & Cook, 2006). In general, individuals tend to be more similar to each other than different, because they share the same sociocultural context (Luo & Klohnen, 2005). Thus, beyond unique similarity between members of a couple (due to interdependence within a particular dyad), a portion of overall intra-couple similarity is likely to be inflated by shared cultural norms and values as well as environmental influences. In other words, partners may be similar not because of idiosyncratic aspects of their own relationship (distinctive similarity) but because they respond in a normative or stereotypical way (stereotype/normative similarity; e.g., most women and men report relatively low levels

of negative DC and high levels of positive DC). Consequently, to estimate whether members of a couple are more similar to one another than are members of a randomly paired dyad (Kenny et al., 2006), stereotype adjustments should be considered. Humbad, Donnellan, Iacono, McGue, and Burt (2013) recommend presenting results with and without adjustments for stereotype/normativeness effects. Accordingly, two additional aims were established: c) to compare stereotype-adjusted and unadjusted indexes of similarity and d) to examine whether the effects of similarity in DC on partners' adjustment are similar or different as a function of stereotype adjustments.

We formulated the following hypotheses. First, given the distinctive scenarios concerning intra-couple similarity during the transition to parenthood (traditional roles vs. equity roles), it is difficult to accurately predict the degree of similarity in DC within couples: (a) on the one hand, in line with a more traditional perspective, we could expect low intra- couple similarity in engagement in DC behaviors, particularly after childbirth; (b) on the other hand, along with societal changes around parenthood occurring worldwide, including in Portugal, we could anticipate high similarity within couples (perceived and actual) at both times. Accordingly, we did not establish a specific hypothesis for our first objective. However, based on the reviewed literature about stereotype/normativeness effects when examining couples' similarity (e.g., Humbad et al., 2013; Kenny et al., 2006), and the findings of previous studies specifically addressing similarity in DC (Iafrate, Bertoni, Donato, et al., 2012; Iafrate, Bertoni, Margola, et al., 2012), we expected that the degree of similarity within couples would decrease when it was adjusted for stereotype effects (hypothesis 1). Second, concerning the consequences of a couple's similarity in DC, we hypothesized that more similarity in DC would be beneficial and would predict better long-term adjustment (i.e., fewer internalizing symptoms and parenting stress and higher dyadic adjustment; hypothesis 2). Since the perception of equitable exchanges of support seems to have interpersonal benefits within the couple (Lemay & Clark, 2008; Murray et al., 2002), and the adjustment of partners in a couple is not independent from one another (Don & Mickelson, 2012), it would be reasonable to assume that one partner's perceived similarity would predict not only their own (hypothesis 2a) but the other partner's adjustment as well (hypothesis 2b). We also anticipated stronger associations with perceived rather than actual similarity (hypothesis 3) and that the effects of similarity on partners' adjustment would decrease once adjusted for stereotype effects (hypothesis 4).

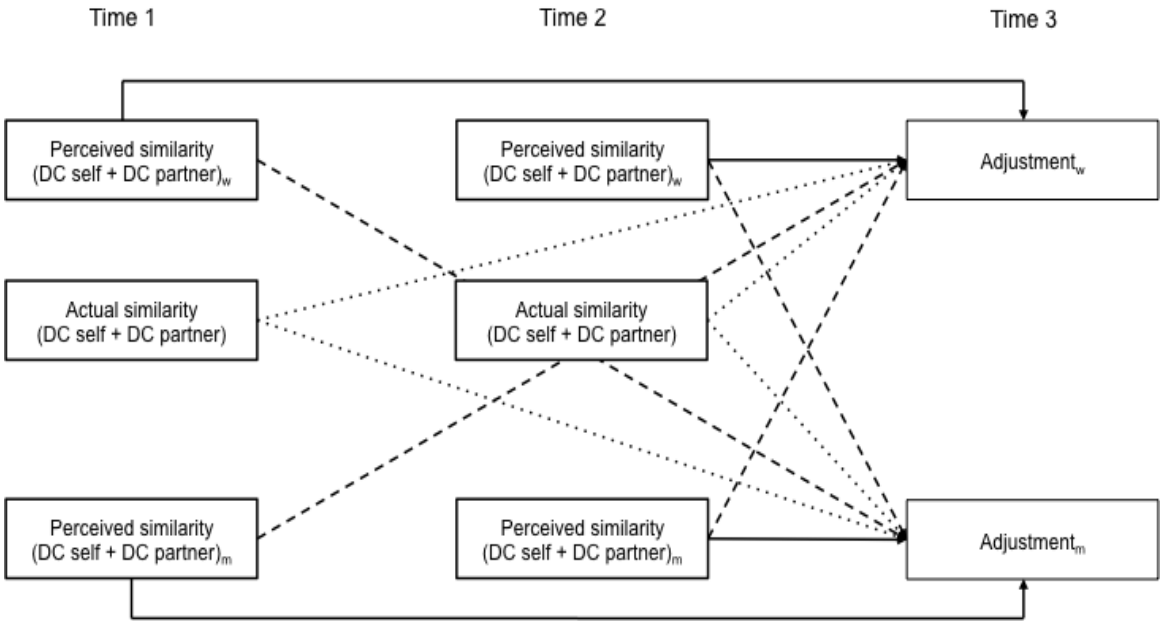

Figure 1 | Conceptual diagram of the long-term effects of similarity in dyadic coping (DC) on women and their partners' postpartum adjustment

Note. The dotted black arrows represent the paths for actual similarity, the solid black arrows represent the actor effects of perceived similarity and the black dashed arrows represent the partner effects of perceived similarity. Perceived similarity = within-partner perception of DC by oneself (what I do to help my partner coping with his/her stress) and DC by partner (what my partner do to help me coping with my own stress); Actual similarity DC self = between-partners comparisons of DC by oneself; Actual similarity DC partner = between-partners comparisons of DC by partner; Time 1 = second trimester of pregnancy; Time 2 = 6 weeks postpartum; Time 3 = 6-9 months postpartum; w = women; m = men.

Method

Participants

The final sample comprised the 92 couples who completed the study. All couples were heterosexual and most were married (70.7%) or unmarried but cohabitating (26.1%), with a mean relationship length of 7.40 years (*SD* = 4.23, range = 11 months – 17 years). Most couples were first-time parents (*n* = 63; 68.5%). The women (*M* = 31.78, *SD* = 4.77, range = 20-41) were younger than the men (*M* = 33.51, *SD* = 5.18, range = 20-45; $t_{(90)}$ = -5.04, $p < .001$, $d = .74$), and 66% of the women had a university education compared to 42.2% of the men, $\chi^2(2) = 13.93$, $p = .001$, $\varphi_c = 0.28$. The majority of women (84.6%) and

men (90%) were employed at T1. The frequency of a prior history of psychopathology among women was significantly higher than among men (psychological problems: 38.5% vs. 4.4%; $\chi^2(1) = 30.97$, $p < .001$, $\varphi_c = 0.41$; psychological treatment: 27.5% vs. 12.1%; $\chi^2(1) = 6.79$, $p = .009$, $\varphi_c = 0.19$). A low proportion of women reported prior pregnancy loss (21%) or infertility history (9%). A planned and desired pregnancy was reported by the majority of women (88% and 97.8%, respectively), with few presenting gestational (22.8%) or delivery (20.7%) complications. The number of female and male newborns was equivalent (45 female and 47 male).

Procedure

This longitudinal prospective study was conducted at one referral Portuguese hospital (blind for review) from November 2015 to September 2017. The Research Ethics Committees of the (blind for review) and university hospital (blind for review) approved all procedures of sample recruitment and data collection. Couples (a) in which the woman was experiencing a singleton pregnancy (gestational weeks 12-26) with no complications with the baby (e.g., fetal anomalies or other medical problems) or other adverse clinical events, (b) formally married, cohabiting or dating, (c) with partners' aged 18 years or older, and (d) who were Portuguese speaking were eligible to participate in the study.

Consecutive pregnant women (or couples, when applicable) attending obstetric appointments at the maternity (blind for review) were presented the research project by their obstetrician. Upon individuals' permission to be contacted further, the researchers presented study details (i.e., design and aims, participants and researchers' roles, ethical and confidentiality considerations) to 611 couples, of which 551 (90.2%) agreed and fulfilled the inclusion criteria to participate. Each member of the couple filled out an informed consent form (a copy was given to each partner) and received separate assessment protocols (second trimester of pregnancy – T1), including instructions to be completed separately at home and to be returned at the next obstetric appointment. The researchers received 335 protocols (participation rate: 60.8%), 303 of which were from eligible couples (32 were excluded because of non-fulfillment of inclusion criteria or women's completion only). Couples returned the T1 questionnaires between 12 and 37 weeks of gestation ($M = 23.00$, $SD = 5.30$).

At six weeks postpartum (T2), 290 couples were mailed two separate protocol assessments (one for each partner) and were requested to send them back to the research team by means of a pre-stamped envelope. Thirteen couples were not contacted at this time because five couples experienced perinatal loss and information about delivery was not available for eight couples. In total, 138 (47.6%) couples participated, returning the T2 questionnaires between six and 11 weeks postpartum (82.7%; *M* = 9.40, *SD* = 3.12, range: 6-21). At the end of six months postpartum (T3), two sets of questionnaires were sent together by mail to 137 couples (one couple demonstrated unwillingness towards additional participation), of whom 92 (67.2%) returned the T3 questionnaires answered by both women and men (on average, between six and seven months postpartum: 78.3%; *M* = 6.83, *SD* = 0.85, range = 5.5 – 9.0). At all assessment points, a text message reminder was sent to all couples to maximize returns (at T1 one or two days before the obstetric appointment and at T2 and T3 within two to three weeks later if no protocol was returned). Participation was voluntary and not compensated.

Men who did not complete the three assessments had prior children with more frequency ($\chi^2(1) = 4.64$, $p = .031$, $\varphi_c = 0.13$) than those who did. They also reported less DC by themselves ($t_{(285)} = 3.63$, $p <. 001$, $d = .46$) and their partners ($t_{(285)} = 3.74$, $p < .001$, $d = .47$) at T1. Women who dropped out reported more pregnancy complications ($\chi^2(1) = 7.58$, $p = .006$, $\varphi_c = 0.16$) at T1 and described the current pregnancy as planned with less frequency ($\chi^2(1) = 6.19$, $p = .013$, $\varphi_c = 0.15$). They also reported less DC by the partner ($t_{(287)} = 3.37$, $p = .001$, $d = .44$). Finally, women and men who completed the study reported better dyadic adjustment at T1 (women: $t_{(287)} = 2.39$, $p = .017$, $d = .32$; men: $t_{(286)} = 3.06$, $p = .002$, $d = .39$) than did non-completers.

Measures

Socio-demographic and clinical characteristics

At T1, both members of the couple provided socio-demographic and clinical data through a self-reported questionnaire developed by the authors. At T1 and T2, women also provided obstetric information. Both partners completed the following self-reported questionnaires.

Dyadic coping

DC was assessed via the Portuguese version (PV) of the Dyadic Coping Inventory (DCI; Bodenmann, 2008; PV: Vedes, Nussbeck, Bodenmann, Lind, & Ferreira, 2013) at T1 and T2. This is a widely used instrument that assesses stress communication and DC behaviors (supportive, delegated, negative and common) across 37 items. With the exception of common DC, each participant is asked to rate (a) his/her own stress communication and engagement in DC behaviors in response to the other's stress (DC enacted by oneself) and (b) his/her partner's stress communication and coping efforts when the participant communicates stress (DC enacted by partner) on a 5-point response scale (1 = *very rarely* to 5 = *very often*). A total of nine subscales could be computed (stress communication by oneself, stress communication by partner, supportive DC by oneself, supportive DC by partner, delegated DC by oneself, delegated DC by partner, negative DC by oneself, negative DC by partner, and common DC). However, for the present study, we aggregated the supportive, delegated, and negative DC subscales into a scale summarizing the behaviors enacted by oneself to support the other partner in coping with his or her stress (11 items; e.g., "I show empathy and understanding to my partner"; "When my partner feels he/she has too much to do, I help him/her out"; "When my partner is stressed I tend to withdraw") and a scale summarizing one partner's perception of the other partner's DC behaviors when the first partner is stressed (11 items; e.g., "My partner shows empathy and understanding to me"; "When I am too busy, my partner helps me out"; "When I am stressed, my partner tends to withdraw"). The total score of each subscale was calculated based on the mean of the respective items, with the items assessing negative DC reverse-coded before scale aggregation. Higher scores suggest more positive DC behaviors enacted by oneself and by the partner, respectively. In the present study, Cronbach's α ranged from .83 (DC by oneself – T1, women) to .92 (DC by partner – T2, women).

Internalizing symptoms

Two instruments were used to assess internalizing symptoms at T1, T2 and T3: the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987; PV: Areias, Kumar, Barros, & Figueiredo, 1996) and the Anxiety subscale of the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983; PV: Pais- Ribeiro et al., 2007). The EPDS assesses prenatal and postpartum depressive symptoms. It consists of

10 items that participants answer using a 4-point response scale and considering the previous seven days. A total score can be computed through the sum of all items, with higher scores reflecting more depressive symptoms. In this study, Cronbach's α values ranged from .81 (for both women and men at T2) to .86 (for men at T3). The Anxiety HADS subscale contains 7 items answered on a 4-point scale considering the previous week. A total score is obtained by summing the 7 items and can range from 0 to 21 points. Higher scores indicate higher levels of anxiety symptoms. Cronbach's α values for the present sample ranged from .78 (T2 – women, T3 – men) to .83 (T3 – women). We created an aggregated measure of internalizing symptoms for each gender and assessment points by averaging the scores of depressive and anxiety symptoms, which were strongly correlated ($r > .65$, $p < .001$).

Dyadic adjustment

The Revised Dyadic Adjustment Scale (RDAS; Busby, Christensen, Crane, & Larson, 1995; PV: Pereira, Moura-Ramos, Narciso, & Canavarro, 2017) was used to assess marital adjustment at T1, T2, and T3. The RDAS is a 14-item questionnaire that assesses three dimensions of marital adjustment: relationship satisfaction, cohesion and consensus. An overall score of dyadic adjustment can be calculated by combining the scores on each subscale and was used in the present study. Participants indicated how much they agreed with each statement of the questionnaire on a 6-point response scale (e.g., 0 = *always disagree* to 5 = *always agree*) or a 5-point response scale (e.g., 0 = *never* to 4 = *every day*). Higher scores reflect higher relationship quality. The Cronbach's α obtained in this study varied between .80 (T1 – women) and .92 (T3 – men).

Parenting stress

Parenting stress was assessed with the Parenting Stress Index – Short Form (PSI-SF; Abidin, 1995; PV: Santos, 2011) at T2 and T3. The PSI-SF contains 36 items (e.g., "I often have the feeling that I cannot handle things very well") covering three dimensions of parenting stress: stress associated with the parenting role (Parental Distress), the child (Difficult Child) and the parent-child relationship (Parent–Child Dysfunctional Interaction). Participants indicate their level of agreement regarding each statement of the questionnaire from 1 (*strongly disagree*) to 5 (*strongly agree*). The sum of all items yields a

global score of parenting stress, which was used in the present study. In this study, Cronbach's α ranged between .91 (T3 – women) and .94 (T2 – men).

Data Analysis

Computing profile similarity correlations

We first computed the indexes of actual similarity in DC for each couple and the indexes of perceived similarity in DC for each member of a couple, following the Iafrate, Bertoni, Margola, et al. (2012) procedure. The database was restructured to consider each partner as a different variable and each item as the subject of the analysis. The number of items used to calculate the indexes (n = 11) x the total number of dyads (n = 92) represents the total number of observations/sample size.

First, to estimate actual similarity within each couple, we computed Pearson profile similarity correlations between each partner's ratings across all items on a given domain/subscale (i.e., we correlated one partner's ratings across specific items with the other partner's ratings on those same items): DC by oneself (11 items) and DC by partner (11 items). This approach yielded two dyadic indexes. By correlating partner ratings across the 11 items that constitute the DC by oneself subscale, we obtained an index of *actual similarity in providing support*, and by correlating partner ratings across the 11 items that constitute the DC by partner subscale, we obtained an index of *actual similarity in receiving support*. The profile correlations can range from -1.0 (suggesting dissimilarity or complementarity) to +1.0 (suggesting similarity). A positive correlation suggests that partners are relatively similar in their profiles to one another, while a negative correlation indicates that partners are quite opposite or complementary. Correlations close to 0 indicate neither similarity nor dissimilarity (Luo & Klohnen, 2005). Second, to compute each partner's perceived similarity in DC, we computed within-person correlations across the corresponding items of each subscale (i.e., correlations between women's responses to the items assessing DC by oneself and women's responses to the parallel items assessing DC by partner and correlations between men's responses to the items assessing DC by oneself and men's responses to the parallel items assessing DC by partner). We computed the indices by first considering the raw scores. Then, we computed indexes adjusted for normativeness/stereotype effects (i.e., the individuals' typical or normative responses given for a set of variables). We calculated the mean for each item across

couples and separately for women and men and assessment time points (T1 and T2) and subtracted the corresponding mean from the individual's rating before calculating the dyadic indexes (Kenny & Acitelli, 1994; Kenny et al., 2006). Accordingly, the adjusted values represent unique similarity within each couple (i.e., distinctive similarity) because the typical profile of response for men and women, respectively, was removed. All the resulting profile correlations were transformed (*r* to Fisher's Z scores) prior to conducting the analyses.

Analyses

Descriptive statistics were computed using the Statistical Package for the Social Sciences (IBM SPSS, version 23.0) to characterize the study sample and main variables. The significance of each profile correlation (unadjusted and adjusted to stereotype effects) was tested against 0 by computing a one-sample *t* test. Paired *t* tests were used to compare unadjusted and adjusted profiles at T1 and T2 as well as to examine the stability of the similarity indexes from T1 to T2. Bivariate Pearson's correlations were calculated between the main study variables, including between women's and men's scores, to estimate dyadic interdependence. We interpreted the effect sizes as follows: small: $d \geq .20$, $\varphi_c \geq .10$, $r \geq .10$, $R^2 \geq .02$; medium: $d \geq .50$, $\varphi_c \geq .30$, $r \geq .30$, $R^2 \geq .13$; large: $d \geq .80$, $\varphi_c \geq .50$, $r \geq .50$, $R^2 \geq .26$ (Cohen, 1988).

Using structural equation modelling (SEM), we conducted a modified Actor-Partner Interdependence Model (APIM; Kenny et al., 2006) in Mplus 8 (Muthén & Muthén, 1998- 2017) to simultaneously examine the effects of all similarity indexes at T1 and T2 on women and their partners' adjustment at T3 beyond the main actor and partner effects of individual perceptions of DC by oneself and DC by partner. The actor and partner effects of each partner's individual raw scores in the DC subscales at T1 and T2 (operationalized as the mean of the items used to compute each similarity index) were not the focus of the present study and were included only for control purposes (i.e., to estimate the role of the within and dyadic combinations beyond self-ratings). An APIM was estimated for each of the three outcomes assessed at T3 in separate analyses (internalizing symptoms, dyadic adjustment and parenting stress). In all models, we considered the non-independence of the observations by accounting for the scores of the variables assessed at previous times (i.e., the effects of the variables assessed at T1 on the variables assessed at T2 and the effects of the outcome variables assessed at T1 and T2

on the outcome at T3). The predictor variables (baseline levels of the outcomes and original DC subscales) were grand-mean centered (Kenny et al., 2006). In its current version, Mplus did not produce variance inflation factor (VIF) values to estimate concerns of multicollinearity in SEM models. To address this issue, we performed multiple regressions in SPSS (for women and men and for each outcome separately) considering all the predictors at the same time and analyzed the tolerance and VIF values. The tolerance values were all higher than 0.1 and the VIF values lower than 10 (Field, 2009). Accordingly, severe multicollinearity did not seem to be present in our models; thus, the predictors were included together.

Prior to conducting the APIMs, Pearson's correlations between the main socio-demographic characteristics (parity and relationship length) and the study variables were computed to identify potential covariates to be included in the models. The APIM accounts for interdependencies between partners because all the exogenous variables (variables assessed at T1) are inter-correlated, as are the error disturbances for all the endogenous variables (i.e., variables assessed at T2 and the two outcome variables assessed at T3, respectively). All models were computed using the unadjusted and stereotype-adjusted indices in separate analyses. Unstandardized path coefficients and their standard errors were reported (Kenny et al., 2006).

To obtain simpler models, actor and partner effects (when applicable) were constrained to be equal across gender, and the model fit of these constrained models was estimated. In the presence of a significant chi-square statistic ($p < .05$), we followed Saris, Satorra and Sorbom's (1987) recommendations to identify model misspecification and examine the modification index (MI) in combination with the expected parameter change (EPC). We made changes accordingly (i.e., we gradually unconstrained the actor and partner effects, respectively) when theoretically meaningful and examined significant changes in the model fit (χ^2 difference test for nested models; $\Delta\chi^2$). The final model fit was estimated based on the following criteria: a nonsignificant chi-square statistic ($p > .05$), a comparative fit index (CFI) above 0.95, and a root-mean-square error of approximation (RMSEA) below .05 (Hu & Bentler, 1998). Missing data were managed using full information maximum likelihood (FIML) in Mplus, an approach that estimates parameters using all available data (Enders & Bandalos, 2001). Significance was set at the level $p < .05$.

Results

Intra-Couple Similarity in Dyadic Coping Over Time

The average similarity indexes were significantly above chance (i.e., different from 0), with a magnitude ranging between small to medium (see Table 1). All means were positive, suggesting that partners were more similar than complementary, but there was significant heterogeneity across couples, indicating that some couples were more similar than others. The adjusted values were significantly lower than the unadjusted values at T1 and T2, and all the average correlations were small in magnitude. Each partner's perceived similarity and couples' actual similarity were stable over time. When comparing women's and men's scores of perceived similarity in DC, we found no significant differences at T1 (unadjusted values: $t_{(74)}$ = -0.22, p = .830, d = .03; adjusted values: $t_{(91)}$ = -0.46, p = .650, d = .07) or at T2 (unadjusted values: $t_{(72)}$ = -0.19, p = .853, d = .03; adjusted values: $t_{(90)}$ = -0.74, p = .463, d = .11).

Table 1 | Perceived and actual similarity in dyadic coping: Descriptive statistics and comparison tests

	Time 1				Time 2				Time differences			
	Unadjusted values	Adjusted values	Diff U-A		Unadjusted values	Adjusted values	Diff U-A		Unadjusted values		Adjusted values	
	M (*SD*)	*M* (*SD*)	*t* test	*d*	*M* (*SD*)	*M* (*SD*)	*t* test	*d*	*t* test	*d*	*t* test	*d*
Women PS	.34 (0.34)***	.22 (0.38)***	4.58***	0.71	.38 (0.35)***	.26 (0.38)***	4.87***	0.76	-0.79	0.13	-0.89	0.13
Men PS	.38 (0.35)***	.24 (0.37)***	5.17***	0.78	.39 (0.40)***	.29 (0.42)***	6.68***	1.05	0.06	0.01	-1.17	0.17
AS DCs	.32 (0.42)***	.15 (0.45)**	6.07***	0.92	.38 (0.40)***	.19 (0.46)***	6.39***	0.99	-0.79	0.13	-0.15	0.03
AS DCp	.32 (0.43)***	.19 (0.43)***	5.47***	0.85	.24 (0.40)***	.13 (0.45)**	4.71***	0.74	1.06	0.18	0.99	0.14

Note. Paired *t* tests were performed on Fisher's *r*-to-*z* transformed values but raw correlation coefficients are reported in the table for ease of interpretation. The asterisks following the descriptive statistics correspond to the one-sample *t* test. Time 1 = second trimester of pregnancy; Time 2 = 6 weeks postpartum; Unadjusted/adjusted values = values non-adjusted vs. adjusted to stereotype effects; Diff U-A = Differences between unadjusted and adjusted values; Women PS = Women's perceived similarity in DC; Men PS = Men's perceived similarity in DC; AS DCs = actual similarity in providing support (DC by oneself); AS DCp = actual similarity in receiving support (DC by partner).

** $p < .01$; *** $p < .001$

Preliminary Correlations between Study Variables

Table 2 shows the correlations between study variables. Women and men's outcomes were moderately to strongly correlated, therefore supporting the non-independence between members of a couple. Parity and relationship length were not significantly correlated with any of the study variables (correlations ranged from .00 between parity and men's parenting stress at T3 and -.19 between relationship length and men's perceived similarity at T1) and thus were not included in the subsequent analyses.

Table 2 | Descriptives and intercorrelations between study main variables

	Women *M* (*SD*)	Men *M* (*SD*)	1	2	3	4	5	6	7	8	9
Individual-level											
1. PS (T1)	0.46 (0.57)	0.48 (0.51)	**.04**	.15	-.18	.19	-.13	.13	.11	-.05	-.02
2. PS (T2)	0.54 (0.68)	0.56 (0.71)	.20	**.13**	-.22*	.13	-.15	.15	.17	.11	.17
3. IS (T3)	5.54 (3.52)	3.95 (3.01)	.06	-.19	**.33*** **	-.53***	.65***	-.24*	-.19	-.09	-.22
4. DA (T3)	53.51 (8.69)	54.32 (9.55)	-.08	.05	-.48***	**.71*** **	-.61***	.22*	.26*	.00	.11
5. PSI (T3)	57.67 (13.73)	59.69 (15.85)	.08	-.24*	.55***	-.62***	**.60*** **	-.27*	-.30*	-.06	-.11
Couple-level											
6. AS DCs (T1)	-	-	.03	.09	-.17	.23*	-.37*	-	-	-	-
7. AS DCp (T1)	-	-	.24*	.04	-.09	.26*	-.24*	.47***	-	-	-
8. AS DCs (T2)	-	-	.41***	.15	-.16	.05	-.13	.10	.16	-	-
9. AS DCp (T2)	-	-	.33**	.12	-.23*	.07	-.17	.24*	.25*	.65***	-

Note. Correlations for women are presented below the diagonal, and for men above the diagonal. Correlations between partner's scores are reported on the diagonal in bold. T1 = Time 1, second trimester of pregnancy; T2 = Time 2, 6 weeks postpartum; T3 = Time 3, 6-9 months postpartum; PS = perceived similarity in DC; IS = internalizing symptoms; DA = dyadic adjustment; PSI = parenting stress; AS DCs = actual similarity in providing support (DC by oneself); AS DCp = actual similarity in receiving support (DC by partner). Bivariate Pearson correlations were computed using the Fisher's z values unadjusted to stereotype effects.

* $p < .05$; ** $p < .01$; *** $p < .001$

Effects of Intra-Couple Similarity in Dyadic Coping on Women's and Their Partner's Adjustment

For each outcome and considering the unadjusted and stereotype-adjusted values, we tested several models to identify the most parsimonious one (based on the MI in combination with the EPC).

Internalizing symptoms

Model with unadjusted values. By constraining all the actor effects and partner effects to be equal across gender, we obtained a significant chi-square test statistic ($p < .05$) ($\chi^2(68) = 99.82$, $p = .007$), which means that at least one pair of path coefficients was significantly different between women and men in this model. We observed that all pairs of path coefficients could be fixed to be equal across genders without significant decreases in the model fit, except the following parameters that remained free: the partner effects of DC by oneself at T1 ($\Delta\chi^2 = 14.73$, $\Delta df = 1$, $p < .001$) and DC by oneself at T2 ($\Delta\chi^2 = 9.72$, $\Delta df = 1$, $p = .002$) on internalizing symptoms at T3 and the actor effects of DC by oneself at T1 on internalizing symptoms at T2 ($\Delta\chi^2 = 4.70$, $\Delta df = 1$, $p = .030$). The remaining paths were fixed as equal for women and men. Our final model fit the data well: $\chi^2 = 79.99$, $df = 65$, $p = .100$; RMSEA = 0.050; CFI = 0.980.

Model with stereotype-adjusted values. We observed that the full constrained model yielded a significant chi-square test statistic ($\chi^2(68) = 113.86$, $p < .001$). Six pairs of path coefficients significantly decreased the model fit and thus were left to vary freely between women and men: the partner effects of DC by oneself at T1 ($\Delta\chi^2 = 15.37$, $\Delta df = 1$, $p < .001$) and DC by oneself at T2 ($\Delta\chi^2 = 5.12$, $\Delta df = 1$, $p = .024$) and the partner effects of internalizing symptoms at T2 ($\Delta\chi^2 = 4.59$, $\Delta df = 1$, $p = .032$) on internalizing symptoms at T3; the actor effects of DC by oneself at T1 ($\Delta\chi^2 = 14.62$, $\Delta df = 1$, $p < .001$) and DC by partner at T1 ($\Delta\chi^2 = 6.97$, $\Delta df = 1$, $p = .008$) on perceived similarity in DC at T2; and the actor effects of DC by oneself at T1 on internalizing symptoms at T2 ($\Delta\chi^2 = 4.89$, $\Delta df = 1$, $p = .027$). Our final model fit the data well: $\chi^2 = 72.67$, $df = 62$, $p = .167$; RMSEA = 0.043; CFI = 0.986.

Main findings. In both models, we observed that one partner's perceived similarity in DC at T2 negatively predicted the other partner's internalizing symptoms at T3. Regarding individual main effects, we found that the more men engaged in DC by oneself at T1, the more women reported internalizing symptoms at T3. Additionally, in

the model with stereotype-adjusted values, we found that an individual's perceived similarity in DC at T1 positively predicted his/her own internalizing symptoms at T3.

Table 3 | Effects of Similarity in Dyadic Coping at Pregnancy (T1) and 6 weeks postpartum (T2) on Couples' Internalizing Symptoms at 6-9 Months Postpartum (T3)

	Actor effects		Partner effects	
	Unadjusted values	Adjusted values	Unadjusted Values	Adjusted values
	B (SE)	*B (SE)*	*B (SE)*	*B (SE)*
Individual-level				
Outcome T1	0.25 (0.07)***	0.26 (0.07)***	-0.09 (0.07)	-0.09 (0.07)
Outcome T2	0.46 (0.08)***	0.46 (0.08)***	0.18 (0.08)*	0.37 (0.11)***
				0.11 (0.09)
DCS (T1)	-1.12 (0.64)	-0.95 (0.63)	2.26 (0.85)**	2.39 (0.81)**
			-1.51 (0.77)	-1.40 (0.76)
DCP (T1)	0.64 (0.58)	0.27 (0.56)	-0.85 (0.59)	-1.01 (0.56)
PS (T1)	0.45 (0.33)	**0.95 (0.34)****	0.20 (0.33)	0.49 (0.35)
DCS (T2)	0.54 (0.59)	0.82 (0.58)	-1.81 (0.78)*	-1.35 (0.75)
			0.98 (0.70)	0.72 (0.72)
DCP (T2)	-0.57 (0.56)	-0.43 (0.52)	0.73 (0.54)	0.76 (0.52)
PS (T2)	-0.06 (0.27)	-0.33 (0.31)	**-0.83 (0.27)****	**-1.17 (0.32)*****
Couple-level				
AS DCs (T1)	-0.12 (0.26)	-0.10 (0.19)		
AS DCp (T1)	-0.03 (0.27)	0.21 (0.25)		
AS DCs (T2)	0.22 (0.32)	0.15 (0.22)		
AS DCp (T2)	-0.31 (0.37)	-0.46 (0.29)		

Note. R^2 = .56 for women and .63 for men (unadjusted values) and .63 for women and .61 for men (adjusted values). Unstandardized maximum likelihood estimates are described for unadjusted and adjusted values to stereotype effects. Significant relevant estimates are in bold. Regression coefficients were fixed as equal for women and men; when they differed, we first reported the values for women's outcomes and below the values for men's outcomes. DCS = dyadic coping by oneself; DCP = dyadic coping by partner; PS = perceived similarity in DC; AS DCs = actual similarity in providing support (DC by oneself); AS DCp = actual similarity in receiving support (DC by partner).

* $p < .05$; ** $p < .01$; *** $p < .001$

Dyadic Adjustment

Model with unadjusted values. We obtained a significant chi-square test statistic ($\chi^2(68) = 91.01$, $p = .033$) for the full constrained model. Three pairs of parameters were

successively unconstrained because they significantly decreased the model fit: the effects of actual similarity in DC by partner at T1 on women's and men's dyadic adjustment at T2 ($\Delta\chi^2$ = 7.65, Δdf = 1, p = .006) and the actor effects of DC by oneself ($\Delta\chi^2$ = 11.82, Δdf = 1, p < .001) and by partner ($\Delta\chi^2$ = 6.85, Δdf = 1, p = .009) at T1 on perceived similarity in DC at T2. The final model fit the data well: χ^2 = 70.97, df = 65, p = .286; RMSEA = 0.032; CFI = 0.993.

Model with stereotype-adjusted values. Because the full constrained model yielded a significant chi-square test statistic ($\chi^2(68)$ = 95.56, p = .016), we gradually unconstrained the following pairs of paths: the actor effects of DC by oneself ($\Delta\chi^2$ = 15.71, Δdf = 1, p < .001) and by partner ($\Delta\chi^2$ = 7.24, Δdf = 1, p = .007) at T1 on perceived similarity in DC at T2, the effects of actual similarity in DC by partner at T1 on women and men's dyadic adjustment at T2 ($\Delta\chi^2$ = 5.25, Δdf = 1, p = .022), and the actor effects of perceived similarity in DC at T1 on DC by partner at T2 ($\Delta\chi^2$ = 4.53, Δdf = 1, p = .033). The final model fit the data well: χ^2 = 67.91, df = 64, p = .345; RMSEA = 0.026; CFI = 0.996.

Main findings. The model with unadjusted values revealed that the more similar members of a couple actually are in their perceptions of the support they receive from each other (actual similarity in DC by partner) at T2, the higher their dyadic adjustment at T3. These effects did not remain significant in the model with stereotype-adjusted values.

Table 4 | Effects of Similarity in Dyadic Coping at Pregnancy (T1) and 6 weeks postpartum (T2) on Couples' Dyadic Adjustment at 6-9 Months Postpartum (T3)

	Actor effects		Partner effects	
	Unadjusted values	Adjusted values	Unadjusted Values	Adjusted values
	B (SE)	*B (SE)*	*B (SE)*	*B (SE)*
Individual-level				
Outcome T1	0.27 (0.10)**	0.26 (0.09)**	0.08 (0.09)	0.06 (0.09)
Outcome T2	0.56 (0.09)***	0.57 (0.09)***	0.07 (0.09)	0.09 (0.09)
DCS (T1)	1.82 (1.52)	2.47 (1.50)	-2.01 (1.53)	-1.41 (1.53)
DCP (T1)	0.50 (1.39)	0.36 (1.39)	1.43 (1.39)	1.34 (1.39)
PS (T1)	-0.63 (0.79)	-1.35 (0.83)	0.01 (0.79)	0.39 (0.82)
DCS (T2)	0.11 (1.35)	0.18 (1.36)	-1.79 (1.36)	-1.77 (1.36)
DCP (T2)	0.39 (1.29)	-0.10 (1.26)	2.26 (1.29)	1.77 (1.26)
PS (T2)	0.43 (0.59)	0.45 (0.73)	0.88 (0.58)	0.94 (0.71)
Couple-level				
AS DCs (T1)	-0.89 (0.66)	-0.56 (0.55)		
AS DCp (T1)	0.87 (0.72)	0.59 (0.75)		
AS DCs (T2)	-1.17 (0.81)	-0.08 (0.65)		
AS DCp (T2)	**1.97 (0.89)***	1.23 (0.83)		

Note. R^2 = .73 for women and .67 for men (unadjusted values) and .72 for women and .66 for men (adjusted values). Unstandardized maximum likelihood estimates are described for unadjusted and adjusted values to stereotype effects. Significant relevant estimates are in bold. Regression coefficients were fixed as equal for women and men. DCS = dyadic coping by oneself; DCP = dyadic coping by partner; PS = perceived similarity in DC; AS DCs = actual similarity in providing support (DC by oneself); AS DCp = actual similarity in receiving support (DC by partner).

* $p < .05$; ** $p < .01$; *** $p < .001$

Parenting stress

Model with unadjusted values. A significant chi-square test statistic ($\chi^2(56) = 92.40$, $p = .002$) was observed for the full constrained model. We gradually unconstrained the following pairs of paths: the actor effects of DC by oneself ($\Delta\chi^2 = 6.96$, $\Delta df = 1$, $p = .008$) and the effects of actual similarity in DC by oneself ($\Delta\chi^2 = 8.30$, $\Delta df = 1$, $p = .004$) and by partner ($\Delta\chi^2 = 4.73$, $\Delta df = 1$, $p = .030$) at T1 on women and men's parenting stress at T3 and the actor effects of DC by oneself at T1 on parenting stress at T2 ($\Delta\chi^2 = 4.19$, $\Delta df = 1$, $p = .041$). The final model yielded a reasonable fit: $\chi^2 = 73.37$, $df = 52$, $p = .027$; RMSEA = 0.067; CFI = 0.970.

Model with stereotype-adjusted values. We obtained a significant chi-square test statistic ($\chi^2(56) = 99.29$, $p < .001$) for the full constrained model. The following pairs of parameters remained free across genders because they significantly decreased the model fit when constrained as equal: the partner effects of DC by oneself at T1 on parenting stress at T3 ($\Delta\chi^2 = 8.99$, $\Delta df = 1$, $p = .003$); the actor effects of DC by oneself ($\Delta\chi^2 = 16.19$, $\Delta df = 1$, $p < .001$) and by partner ($\Delta\chi^2 = 7.86$, $\Delta df = 1$, $p = .005$) at T1 on perceived similarity in DC at T2; the actor effects of DC by oneself at T1 on parenting stress at T2 ($\Delta\chi^2 = 5.62$, $\Delta df = 1$, $p = .018$) and the actor effects of perceived similarity in DC at T1 on DC by partner at T2 ($\Delta\chi^2 = 4.11$, $\Delta df = 1$, $p = .043$). The final model yielded a reasonable fit: $\chi^2 = 63.98$, $df = 51$, $p = .105$; RMSEA = 0.053; CFI = 0.982.

Main findings. In both models, we observed that one partner's perceived similarity in DC at T2 negatively predicted the other partner's parenting stress at T3. Regarding individual main effects, we found that the more participants engaged in DC at T2, the higher their parenting stress at T3, while the more DC they perceived by their partners, the lower their parenting stress. Engaging in DC at T1 was found to negatively predict one's own parenting stress and to positively predict the other partner's parenting stress at T3. Additionally, in the model with unadjusted values, we found that actual similarity in DC by partner at T1 negatively predicted men's parenting stress at T3.

Table 5 | Effects of Similarity in Dyadic Coping at Pregnancy (T1) and 6 weeks postpartum (T2) on Couples' Parenting Stress at 6-9 Months Postpartum (T3)

	Actor effects		Partner effects	
	Unadjusted values	Adjusted values	Unadjusted Values	Adjusted values
	B (SE)	*B (SE)*	*B (SE)*	*B (SE)*
Individual-level				
Outcome T2	0.38 (0.05)***	0.37 (0.05)***	0.21 (0.05)***	0.24 (0.05)***
DCS (T1)	-6.32 (2.98)*	-8.80 (2.83)**	5.87 (2.86)*	9.58 (3.25)**
	-13.30 (3.18)***			1.57 (3.08)
DCP (T1)	0.59 (2.47)	-0.73 (2.47)	-2.09 (2.56)	-1.77 (2.57)
PS (T1)	1.09 (1.62)	2.50 (1.58)	-0.42 (1.53)	-0.05 (1.56)
DCS (T2)	5.75 (2.63)*	5.38 (2.65)*	-1.39 (2.67)	-0.92 (2.71)
DCP (T2)	-5.77 (2.22)**	-4.70 (2.20)*	3.66 (2.36)	2.56 (2.31)
PS (T2)	0.71 (1.20)	1.38 (1.38)	**-2.75 (1.14)***	**-3.71 (1.39)****
Couple-level				
AS DCs (T1)	-2.95 (1.52)	-0.77 (1.12)		
	1.68 (1.60)			
AS DCp (T1)	-0.33 (1.66)	-1.90 (1.45)		
	-4.06 (1.68)*			
AS DCs (T2)	-1.12 (1.64)	-1.62 (1.23)		
AS DCp (T2)	0.72 (1.83)	1.86 (1.60)		

Note. R^2 = .57 for women and .65 for men (unadjusted values) and .55 for women and .63 for men (adjusted values). Unstandardized maximum likelihood estimates are described for unadjusted and adjusted values to stereotype effects. Significant relevant estimates are in bold. Regression coefficients were fixed as equal for women and men; when they differed, we first reported the values for women's outcomes and below the values for men's outcomes. DCS = dyadic coping by oneself; DCP = dyadic coping by partner; PS = perceived similarity in DC; AS DCs = actual similarity in providing support (DC by oneself); AS DCp = actual similarity in receiving support (DC by partner).

* $p < .05$; ** $p < .01$; *** $p < .001$

Discussion

The present study improves on prior research on DC by (a) adopting a prospective longitudinal design (comprising both the prenatal and short- and long-term postpartum periods); (b) considering the couple as the unit of analysis, taking into account the interdependence between partners and controlling for each partner's individual perceptions; (c) assessing the influence of similarity in DC on dyadic as well as individual and parental adjustment outcomes; and (d) offering a comprehensive picture of the role

of subjective and objective similarity in DC on the multifaceted adjustment of women and men during the transition to parenthood. Several findings emerged from this study.

Intra-Couple Similarity Over Time

The profile similarity indexes were relatively low in magnitude but significantly above chance, which suggests that both members of a couple perceived that they engaged equally in DC behaviors, perhaps because they were actually similar, to some degree, in the support they provided to and received from each other in times of stress. This finding remains salient when we consider the influence of belonging to a particular social group (i.e., stereotype-adjusted indexes of similarity), which means that there is unique similarity within a given couple due to the partners' interdependence, although the degree of similarity decreases, as expected (hypothesis 1). Additionally, the couple's perceived and actual similarity in DC was stable from the second trimester of pregnancy to 6 weeks postpartum, suggesting that, on average, the birth of a child did not lead to changes in women's and men's similarity in supportive dynamics when dealing with each other's stress, as possibly anticipated from a more traditional perspective. Our findings are somewhat consistent with the ambivalent views regarding gender roles during this period: the low degree of similarity within couples underscores the idea that support dynamics within couples are likely to be asymmetric during the transition to parenthood, but the growing changes toward more egalitarian roles are also reflected in our findings, suggesting that, at least in some situations of need, women and men help their partners cope with stress in quite similar ways.

Effects of Intra-Couple Similarity on Partners' Adjustment

We observed that women's and men's *perceptions* of greater similarity in DC soon after childbirth mutually influenced each other's later emotional and parental adjustment beyond the partner's individual perceptions of DC. That is, the more a partner perceives reciprocal involvement to help each other in dealing with stress, the more adjusted his/her spouse is. However, no such benefit was observed at the actor level (i.e., to the self alone). These findings partially supported our second hypothesis: while significant actor effects were not found (inconsistent with hypothesis 2a), partner effects were particularly salient (consistent with hypothesis 2b). These findings are surprising given that most dyadic research demonstrated the greater influence that self/actor characteristics have a on

individuals' outcomes than do partner characteristics but highlight the interdependence between the members of a couple during the transition to parenthood (Perry-Jenkins & Claxton, 2011).

The significant partner effects that we found are consistent with Ryon and Gleason's (2018) study, which demonstrated that one partner's report of supportive reciprocity is negatively associated with the other partner's negative mood during the transition to parenthood, and may suggest that when engagement in DC strategies is perceived as similar, this could stimulate positive dyadic interactions, reflecting increased closeness and a sense of balance in the relationship (Gleason et al., 2003) or less negative interactions, similar to what has been observed when women perceive fairness in childcare (Chong & Mickelson, 2016). In line with the well-documented benefits of projection in romantic relationships (e.g., Lemay & Clark, 2008; Murray et al., 2002), possible verbal and non-verbal expressions of satisfaction with the partner, including supportive behaviors toward him or her, could positively affect the other partner's adjustment. This interpretation is, however, challenged by the fact that the similarity indexes were poor predictors of dyadic adjustment at 6-9 months postpartum. For this variable, only actual similarity in receiving support after childbirth was revealed to be a significant predictor, although this effect was partly due to general beliefs/stereotypes about support exchanges within couples (i.e., the significance disappears when considering unique similarity between two partners). These findings are not surprising given the mixed results regarding the role of perceived similarity in DC for couples' relationship quality (Iafrate, Bertoni, Donato, et al., 2012; Iafrate, Bertoni, Margola, et al., 2012). It could be that concrete dimensions of the couple's functioning (not reflected by the total score of the RDAS used in this study) are more strongly influenced by DC similarity or that such effects are more salient early in this transition. Moreover, the low similarity between partners and the considerable variability across couples could also contribute to the absence of significant associations between the variables. Examining potential mediators through which one partner's perceptions of similarity are associated with the other partner's adjustment would shed light on the current results.

Third, the unique evidence that we found regarding actor effects suggests a prejudicial rather than a beneficial effect of greater perceived similarity in DC *during pregnancy* on one's own emotional adjustment at 6-9 months postpartum. Hypothesis 2a was here partially supported, as there are significant associations but in an unexpected

direction. Along with the findings discussed above, this result suggests differential long-term effects of perceived similarity in DC across pregnancy and the early postpartum period. This finding challenges recent research that, using cross-sectional data, found similar (negative) associations between supportive reciprocity and negative mood across different times during the transition to parenthood (Ryon & Gleason, 2018). One possible explanation for our findings is that during pregnancy, women experience more physical changes and are particularly vulnerable to emotional fluctuations (Hodgkinson, Smith, & Wittkowski, 2014; Staneva, Bogossian, & Wittkowski, 2015) compared to men. Thus, it is possible that given the distinct experiences of the partners, complementarity (as opposed to similarity) of DC efforts during the prenatal period becomes more beneficial in the long term. More than perceiving high similarity, perceiving fairness in DC (i.e., one partner contributes more than the other but it is perceived as fair, perhaps because of societal expectations) or the type of DC strategy (e.g., positive or negative) could matter most, as suggested in previous studies with couples from the community (Iafrate, Bertoni, Margola, et al., 2012). In contrast, perinatal concerns are likely to become more intertwined between partners after childbirth due to the need to manage the changes in the relationship with one another, new routines and parenting responsibilities (Cowan & Cowan, 2000; St John et al., 2005) and therefore would imply more similarity or both partners contributing equally in DC directed at relieving each partner's burden.

Finally, it should be noted that although the effects of perceived similarity during pregnancy and the postpartum period discussed in this study are somewhat surprising, they are consistent with our hypothesis (hypothesis 3), demonstrating the more salient role of perceived vs. actual similarity in DC. Moreover, contrary to our expectations (hypothesis 4), after stereotype effects were controlled, these associations generally remained significant, which means that partners' adjustment depends on some unique similarity between them (i.e., distinctive similarity), possibly reflecting specific shared experiences in their own romantic relationship. Interestingly, despite our findings showed that individuals' perceptions of similarity predict well-being during the transition to parenthood (consistent with the traditional individual approach mostly undertaken in this field of research), these effects emerged mostly across partners rather than within-person, which highlights the pressing need of viewing women and men as part of a dyad in both research and clinical practice.

Limitations and Future Directions

Potential limitations of the present study should be acknowledged. First, the high attrition over time and relevant characteristics distinguishing completers and non-completers indicate that the couples who completed the study were generally well adapted maritally and thus preclude the generalizability of our findings to all couples. It remains to be clarified whether the same pattern of findings holds among a more heterogeneous sample of couples, including same-sex couples. Second, the completion of the questionnaires by each member of the couple at home did not allow us to guarantee that couples completed the questionnaires separately (despite the provided instructions), which may have introduced some bias. Third, couples were asked to classify how they generally support their partners in coping with stress without a specific stressor in mind. It may be worthwhile to examine couples' reactions to the specific transition to parenthood-related stressors (e.g., how they deal with the return to work). Fourth, to substantiate the limitations associated with self-reports, it would be desirable to include observational data that allow capturing the dynamic process of DC from a third perspective. Additionally, to better explain the unexpected findings of the present study, future studies should formally examine some potential mechanisms by which similarity in DC influences partners' adjustment. Importantly, besides the degree of similarity, it would be interesting to assess the absolute level of DC (i.e., whether both partners are low or high in their DC efforts) as well as the perception of fairness in DC across this transition, and how this would be differently associated with partners' adjustment. Finally, our results highlight the importance of assessing other indicators of adjustment beyond the couple's relationship and controlling for normative/stereotype effects when examining the role of the couple's similarity in DC.

Conclusions and Implications for Clinical Practice

Perceiving each other's efforts to help the other partner cope with stress as more similar *after childbirth* leads to better emotional and parental adjustment in the partner. In contrast, perceiving complementary (rather than similar) exchanges when dealing with *pregnancy*-related concerns leads to better psychological adjustment. Mental health professionals should assess the level of similarity in relation to engagement in DC behaviors within couples to help them become aware of how similar or complementary they are in responding to one another's stress. This assessment may allow the

identification of more vulnerable couples. Additionally, professionals working with couples should attend to the fact that each partner's requirements when dealing with prenatal stressors may be different from those needed by their spouse. Therefore, each partner's need for support and coping resources must be assessed so that these can be maximized accordingly.

In line with prior research (Blind for review, 2018ab; Molgora et al., 2018), our findings reinforce the idea that perinatal intervention approaches should include a DC component and efforts should be made to encourage both women's and men's participation as both seem to be influenced by these dyadic processes. While preventive interventions aimed to promote stress management within couples already included a component focusing on the promotion of equity in DC (e.g., Couples Coping Enhancement Training [CCET]; Bodenmann & Shantinath, 2004), our findings suggest important refinements of existing approaches. First, being aware that similar/equitable DC exchanges cannot always be useful, these interventions would benefit from being tailored to the specificities of the phase in which they will be implemented (i.e., before vs. after childbirth) and consider the promotion of complementarity in DC transactions as an alternative target. This aspect is particularly relevant in countries characterized by mixed (traditional and egalitarian) conceptions of motherhood and fatherhood, such as in Portugal. Second, the noticeable role of perceived over that of actual similarity indicates that more than simply improving similar or complementar DC behaviors between partners, each partner's perception of the other partner's DC response and reciprocity between them should be assessed and given particular attention. Targeting such perceptions of both partners (e.g., educating couples about the impact of perceived similarity and enabling them to detect inequity in their relationship after childbirth) could be a relevant mechanism underlying change in DC-based interventions, which should be tested in further efficacy's studies. Finally, mental health professionals working in pre- and postpartum health care settings (e.g., psychologists) may play an important role by increasing other professionals' (e.g., obstetricians, midwives) awareness of these dyadic processes and, specifically, the need for greater inclusion of and attention to fathers (couples) in health services.

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Systematic review

Preventing and treating women's postpartum depression: A qualitative systematic review on partner-inclusive interventions

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Preventing and treating women's postpartum depression: A qualitative systematic review on partner-inclusive interventions

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Abstract

Partner-related factors associated with the occurrence of Postpartum Depression (PPD) may justify the partner's inclusion in preventive and treatment approaches. The aim of this qualitative systematic review was to synthesize the literature on partner-inclusive interventions designed to prevent or treat postpartum depression (PPD) in women. In accordance with the PRISMA guidelines, the systematic search of studies published between 1967 and May 2015 in PsycINFO and PubMed identified 26 studies that met the inclusion criteria, which reported on 24 interventions. The following partner parameters were analyzed: participation type, session content, mental health assessment, attendance assessment, and the effects of partner's participation on the women's response to the interventions. Total participation by the partner was mostly reported in the prevention studies, whereas partial participation was reported in the treatment studies. The session content was mostly based on psychoeducation about PPD and parenthood, coping strategies to facilitate the transition to parenthood such as the partner's emotional and instrumental support, and problem-solving and communication skills. Some benefits perceived by the couples underscore the relevance of the partner's inclusion in PPD interventions. However, the scarce information about the partner's attendance and the associated effects on the women's intervention outcomes, along with methodological limitations of the studies, made it difficult to determine if the partner's participation was associated with the intervention's efficacy. Conclusions about the clinical value of including partners in PPD interventions are still limited. More research is warranted to better inform health policy strategies.

Keywords: Postpartum depression • Prevention • Treatment • Partner • Systematic review

Introduction

The relevance of postpartum depression (PPD) to public health is consensual (Henshaw, Sabourin, & Warning, 2013; O'Hara & McCabe, 2013), with a prevalence rate that may reach 19.2% for minor and 7.1% for major PPD in the first three months postpartum (Gavin et al., 2005). This condition may have serious consequences on relational (e.g., poor partner well-being and relationship difficulties), parenting (e.g., disturbed mother-child interactions) and infant outcomes (e.g., impairments in cognitive and psychosocial development) (O'Hara & McCabe, 2013; Westall & Liamputtong, 2011).

According to previous reviews, interventions targeting PPD are important because they have been found to be effective to either prevent (e.g., Clatworthy, 2012; Pilkington, Whelan, & Milne, 2015) or treat PPD in women (e.g., Dennis & Hodnett, 2007; Goodman & Santangelo, 2011). Although these existing reviews suggested that there are potential benefits of partner-inclusive interventions (i.e., interventions including both the woman and her partner) and the need for additional research in this area, to the best of our knowledge, this topic has not been systematically reviewed.

The inclusion of partners when implementing PPD interventions may be justified for several reasons in terms of both its prevention and treatment. One the one hand, there is evidence that couple-related factors may be protective against the development of perinatal depressive and anxiety symptoms (e.g., communication, relationship satisfaction, emotional and instrumental support; Pilkington, Milne, Cairns, Lewis, & Whelan, 2015), which makes them important targets for preventive intervention efforts (Pilkington, Milne, Cairns, & Whelan, 2016). Involving both partners in preventive interventions may facilitate the training of important couple skills, and lead to positive benefits for both the women's and their partner's mental health (Shapiro & Gottman, 2005). Moreover, the importance of increasing awareness in both members of the couple about perinatal distress and the important role of the women's partners in this context have been stressed (Fonseca & Canavarro, 2017; Henshaw et al., 2013). Both women and their partners highlighted the need to be proactively educated about depression and other concerns (e.g., the changes in the couple's relationship, parenting), ideally before the development of depressive symptoms (Feeley, Bell, Hayton, Zelkowitz, & Carrier, 2016; Letourneau et al., 2012). Women also endorsed a higher involvement of their partners in PPD preventive interventions when these interventions address PPD education

(Wheatley, Brugha, & Shapiro, 2003). By receiving and discussing information about risk factors and signs of PPD, partners may be able to recognize if the woman is at-risk for PPD (Garfield & Isacco, 2009; Letourneau et al., 2012), which may allow them to adjust the support provided to women's needs, or to encourage them in the process of seeking professional help, if needed (Fonseca & Canavarro, 2017).

On the other hand, in the presence of a clinical diagnosis of PPD, potential benefits may emerge by involving the male partners in the women's recovery process. Because of their capacity to provide support and promote women's sense of security when they are faced with PPD (Montgomery, Bailey, Purdon, Snelling, & Kauppi, 2009), it is reasonable to assume that the presence of the women's partners during the therapeutic process may also contribute to the women's recovery process (Misri, Kostaras, Fox, & Kostaras, 2000). First, because the women's partners often have difficulties in understanding their spouse's emotional experiences (Everingham, Heading, & Connor, 2006; Letourneau et al., 2007), they may benefit of being included in treatment plans to learn about the symptoms of PPD and how to provide adequate support and assist women in their recovery (Westall & Liamputtong, 2011). This may help partners feeling less helpless to cope with women's PPD and women may feel more supported (Westall & Liamputtong, 2011). In this context, partner- assisted interventions could be a promising approach, by providing partners with the skills to encourage behavior changes rather than to reinforce maladaptive behaviors (Baucom, Whisman, & Paprocki, 2012). In addition, the presence of the partner in the treatment sessions may be a facilitating factor in improving impaired couple's skills that may contribute to maintain women's symptoms (Carter, Grigoriadis, Ravitz, & Ross, 2010).

Moreover, men themselves often experience depression during pregnancy and the postpartum period, with estimated prevalence rates of, respectively, 8.4% (Cameron, Sedov, & Tomfohr-Madsen, 2016) and 10.4% (Paulson & Bazemore, 2010). The incidence estimates of male depression are particularly high when women were experiencing PPD, ranging from 24 to 50% (Goodman, 2004). In fact, there is sound evidence of the positive association between maternal and paternal depressive symptoms during pregnancy and the postpartum period (Cameron et al., 2016; Paulson & Bazemore, 2010). Couple's comorbidity may maintain or even intensify the women's difficulties: if men experience emotional distress themselves, they may have difficulties in providing adequate support (Roberts, Bushnell, Collings, & Purdie, 2006), which may compromise their role as the

women's primary source of support. Therefore, partner-inclusive interventions may be particularly helpful to increase attention on their own postpartum depressive symptoms (Carter et al., 2010; Westall & Liamputtong, 2011), which may have benefits for both members of the couple and the whole family (Roberts et al., 2006).

Although recommendations have been made about the inclusion of partners in the care and education provided to women in the perinatal period (e.g., Burgess, 2011), there is a dearth of information about the empirical relevance of including both members of the couple in those interventions. No previous reviews of interventions for PPD have specifically addressed this important question, although some prior reviews provided some important insights about the importance of better examining this topic. Goodman and Santangelo (2011) reviewed group treatment interventions for PPD and along with the main review parameters, they also discriminated the number of sessions inclusive of partners, and if they attended alone or with women. In the discussion of their results, and although this was not the focus of the review, the authors highlighted that there is an important gap in the literature concerning the effect of partner's participation on women's outcomes.

A recent review from Pilkington, Whelan, et al. (2015) analyzed preventive interventions for perinatal depressive and anxiety symptoms that included some content addressing partner's support or the couple relationship, regardless of the partner's inclusion in the intervention sessions. Although this previous work provided us some details about the inclusion of the partners in this type of interventions (i.e., whether they were included or not in the intervention sessions, the specific session's content, and whether their mental health was assessed), a wide number of partner-inclusive interventions (i.e., interventions that did not target couple relationship-related factors but have included partners in the intervention sessions) were not analyzed, beyond the fact that no data about partner's attendance or the influence of partner's involvement on women's symptoms changes were reported.

Finally, two systematic reviews found no added value in women's outcomes by including the partner in the PPD interventions. One systematic review and meta-analysis that assessed the potential moderators (e.g., subtypes of cognitive-behavioral therapy [CBT], context of delivery, and partner's inclusion) of the efficacy of CBT to prevent and treat perinatal depression showed that the partner's inclusion did not influence the efficacy

of those interventions (Sockol, 2015). In another meta-analysis, both relational interventions (i.e., couple or family psychotherapy with the involvement of both the woman with depression and her partner) and individual interpersonal psychotherapy (IPT) were effective at reducing perinatal depression among treatment-control study designs, although individual IPT demonstrated larger average effect sizes among pre-post study designs (Claridge, 2014). However, some interventions in this review, which were classified as "individual interventions", included a separate component for partners (e.g., Reay, Fisher, Robertson, Adams, & Owen, 2006).

Despite the relevance of all these reviews, none specified details about the partner's real attendance, and the partner's type of participation in the intervention session(s) was scarcely described. These data are essential to draw conclusions about the effects of their participation on women's responses to the intervention and the characteristics that promote cost-effective partner-inclusive interventions. The lack of information about the content of the sessions delivered to the partners (namely content that may be not exclusively related with the couple relationship, which was not addressed in the review by Pilkington, Whelan, et al., 2015) needs also to be addressed to better inform clinical practice of evidence-based goals and the content of the interventions. Moreover, only the review from Pilkington, Whelan, et al. (2015) reported data on the partner's mental health assessment, whose relevance to women's mental health is unequivocal because it may compromise the provision of adequate support (Roberts et al., 2006), and any review provided concise information about the perceived benefits by women and/or their partners from the partner-inclusive interventions. The assessment of these parameters may provide a deeper comprehension of the core intervention elements that may explain (i.e., potential mediators) or influence (i.e., potential moderators) the ways through which the partner's inclusion may impact women's outcomes. Finally, different approaches (e.g., CBT, IPT) have been shown to be effective in preventing (e.g., Clatworthy, 2012) or treating (e.g., Dennis & Hodnett, 2007) PPD. Moreover, the distinct aims, target populations, and delivery timing (i.e., the prevention may occur antenatally and/or postnatally) of these approaches are likely to influence partner's involvement (e.g., the number and content of the sessions). Hence, it is relevant to analyze their inclusion among a wide range of preventive and treatment partner-inclusive interventions. Our review will be inclusive of all these aspects.

The aim of the present systematic review was to comprehensively review and synthesize the published literature on partner-inclusive interventions delivered during pregnancy and/or postpartum to primarily prevent or treat PPD in women, while attending to the following parameters: (a) type of partner participation, (b) contents addressed in the partner/couple session(s), (c) the partner's attendance assessment, (d) the partner's mental health assessment, and (e) the potential effects of their participation in the women's intervention response and other benefits perceived by the women and/or their partners.

Method

Search Procedure and Eligibility Criteria

We performed a systematic literature search according to the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Liberati et al., 2009) (see Supplementary Materials). A protocol was developed in advance to guide the different steps underlying this review. We conducted literature searches of studies published between 1967 and May 2015 in PsycINFO and PubMed using combinations of the search terms "("postpartum depression" or "postnatal depression" or "perinatal depression") and (prevent* or treat* or intervention or therapy or program or trial) and (couple or partner or marital or dyadic or father or husband or spous*) [all fields]". The search was conducted without language restriction, but only articles written in English were retrieved and considered for inclusion. The reference lists of existing reviews and retrieved articles were examined to identify other relevant studies. Studies were included in the review if they met the following inclusion criteria:

(1) Non-biological interventions delivered during pregnancy or during the first 12 months postpartum with the primary aim to prevent or treat postpartum depression (PPD) or symptoms thereof up to 12 months after birth;

(2) The interventions targeted women (or both members of the couple) and included both partners in the intervention session(s), regardless of the population (e.g., a universal population of pregnant women or mothers or women at-risk in the case of prevention studies);

(3) Prospective pre-/post-intervention study or comparisons of interventions with a control group (CG);

(4) Any type of methodological design (i.e., randomized controlled trial [RCT] or quasi-experimental trial design);

(5) The primary outcome was depressive symptoms assessed using validated self-report or clinician-administered measures.

Articles were not eligible for inclusion if they reported a) non-original research (e.g., article reviews, meta-analyses, book chapters or discussion articles); b) unpublished studies, abstracts, communications, theses, case studies, ongoing studies, or descriptive studies; c) studies assessing the efficacy of a community-based intervention or service (e.g., with multiple functions such as screening, liaison to other services), without a clear prevention/treatment intervention for PPD; d) studies primarily addressing the couple's adjustment, parenting adjustment, infant development, adolescent pregnancy, partner intimate violence or substance abuse, or adjustment to perinatal losses (i.e., PPD as a secondary outcome); e) interventions that targeted only the partner's postpartum depressive symptoms; and f) studies focusing on the prevention/treatment of depression during pregnancy without a clear focus on preventing/reducing depressive symptoms in the postpartum period.

The articles with the primary aim to prevent/treat PPD and simultaneously inter-related outcomes (e.g., anxiety, parenting difficulties, mother-child interactions, marital adjustment, or social support) were included. If more than one article was available on an individual intervention, we included these articles in our analysis but omitted duplicate results.

Coding of the Studies

The characteristics of the studies identified in this review were grouped into intervention characteristics, methodological quality, assessment characteristics, and intervention outcomes. Regarding the intervention characteristics (see Tables 1 and 2, for preventive and treatment studies, respectively), all studies were coded for: (1) authors and country of origin; (2) sample size, calculated for all women allocated in the study conditions (studies with CG)/or that initiated the intervention (pre-post study design); and (3) intervention approach (CBT vs. IPT vs. Counseling vs. Family Therapy vs. Education

vs. Psychosocial). We classified the main approach(es) of the intervention. When the interventions included strategies/techniques based on established psychological therapeutic models (psychological interventions; e.g., CBT, IPT), we coded the therapeutic orientation. Interventions that consisted of providing education about perinatal emotional health (e.g., information about PPD symptoms and professional treatments) and/or parenting issues (e.g., information about transition to parenthood-related changes, activities to enhance parent-child interactions) were categorized as Education. Interventions designed to provide non-specific support to the participants (e.g., discussion of personal postpartum concerns in group) were classified as Psychosocial. The studies were also classified for: (4) study design (randomized controlled trial vs. controlled trial vs. quasi-experimental design vs. open trial); (5) control type (treatment as usual vs. enhanced treatment as usual vs. waiting list vs. not applicable; when the CG consisted of another type, we specified it); (6) intervention format (whether the intervention was conducted individually or in a group format: individual vs. group vs. both); (7) number of sessions; (8) type of partner participation: total (partners were invited to attend to all the sessions with women, with or without specific sessions designed for them) vs. partial (only a specific part of the intervention was designed for partners); and (9) content of the partner/couple session(s).

Preventive studies were also coded for the following: (1) prevention timing (postpartum vs. antenatal vs. both) and (2) prevention type (*indicated* – individuals with subclinical symptoms who do not meet diagnostic criteria; *selected* – targeted individuals with risk factors for a disorder but without symptoms of the disorder; *selected/indicated* – included individuals at-risk and presenting subclinical symptoms; and *universal* – administered to all members of a given population). For *selected* or *selected/indicated* prevention studies, information about the inclusion criteria was provided. This classification followed the Institute of Medicine criteria for preventive interventions for mental disorders (Mrazek & Haggerty, 1994).

The appraisal of the methodological quality of the reviewed studies was based on several indicators consistently reported for the quality assessment of quantitative research (Downs & Black, 1998; National Collaborating Centre for Methods and Tools, 2008) and included the following: (1) sociodemographic characterization of the sample (yes vs. no); (2) sample size power calculations (yes vs. no); (3) intention-to-treat analysis (yes vs. no); (4) control for confounders in data analyses (yes vs. no); (5) more than one assessment

time points (yes vs. no); (6) blinding of the outcome assessors (yes vs. no vs. not applicable); (7) drop-outs (specification of the allocated participants who did not receive or discontinued the intervention and the associated reasons; yes vs. no); and (8) loss to follow-up (specification of the participants who did not complete the post-intervention/follow-up measures and the associated reasons; yes vs. no). Treatment studies were also classified for (9) whether participants with PPD who were receiving antidepressant or psychological treatment at baseline were excluded from the study (yes vs. no).

Regarding the assessment characteristics (see Tables 4 and 5, for preventive and treatment studies, respectively), the studies were coded for: (1) method of outcome assessment (self-report vs. clinician-administered measure vs. both); (2) outcome measure and cut-off/diagnostic criteria; and (3) postpartum (for the preventive studies) and post-intervention (for the treatment studies) timing of the assessments (in weeks). For treatment studies (Table 5), when the assessments were conducted immediately post-intervention, they were coded as 0 weeks. For the studies in which the assessments occurred at a specific time point (e.g., weeks post-enrollment), we clarified this information. The studies were also classified for: (4) women's attendance (number/percentage of women attending the intervention sessions) and (5) partner/couple's attendance (number/percentage of partners/couples attending the intervention sessions). For treatment studies, the diagnostic criteria for participants being included in the study were also reported (Table 5). Overall, when these characteristics were not clearly specified in the included studies, we coded as not specified. Finally, we reported the intervention' outcomes relevant for this review: the efficacy of the intervention in preventing (Table 6) or treating (Table 7) women's depressive symptoms and relevant information about the partner (e.g., partner's depressive symptoms outcomes, benefits of their participation).

Study Selection and Data Extraction Process

The first author defined and conducted the search strategy, reviewed the titles and abstracts of the electronic searches, and assessed the studies for eligibility. The first and second authors analyzed independently each article that met the inclusion criteria, using a standard data codification form that specified the intervention and assessment characteristics, and described the intervention outcomes. A quality assessment of each

study was considered in the interpretation of the results. The first author assessed the methodological quality of included studies and the second author checked the extracted data. Any doubts that have arisen during the selection of the studies to be included in the systematic review, as well as any disagreement during the data collection process were discussed and resolved by consensus between the first and second authors or, if necessary, by discussion with the remaining authors, who supervised this process. None of the authors of the studies included in this review were contacted for additional information. A qualitative and descriptive synthesis using five key parameters of the reviewed studies was conducted.

Results

Figure 1 shows a flow chart illustrating the search strategy of the studies included. Through the electronic search, 3665 references were retrieved and 145 additional references were identified for possible inclusion by searching the references of relevant studies or reviews (*N* = 3810). After deletion of duplicate studies, 3644 abstracts and titles were screened. Of those, the full-texts of 235 available studies were retrieved for possible inclusion in the review (eight publications were not available despite attempts to contact the respective authors) and 207 were excluded for the following reasons: (1) the intervention did not include the partner in the intervention session(s) (*n* = 162) or (2) this information was unclear (i.e., the partners filled out the assessment measures but no data were reported about a possible inclusion in the delivered intervention; *n* = 2); (3) the primary outcome was not women's postpartum depressive symptoms or a clinical diagnosis of PPD (e.g., dyadic/parenting variables and depressive symptoms during pregnancy; *n* = 15); (4) the population was not limited to women during the perinatal period (e.g., participants with children aged above 1 year; *n* = 6); (5) the study design was a case study/report (*n* = 10); (6) there was no assessment of the efficacy of the intervention (i.e., descriptive and feasibility studies without the assessment of depressive symptoms; *n* = 5); and (7) the study aim was not to assess a specific intervention for PPD (e.g., community-based intervention; *n* = 7).

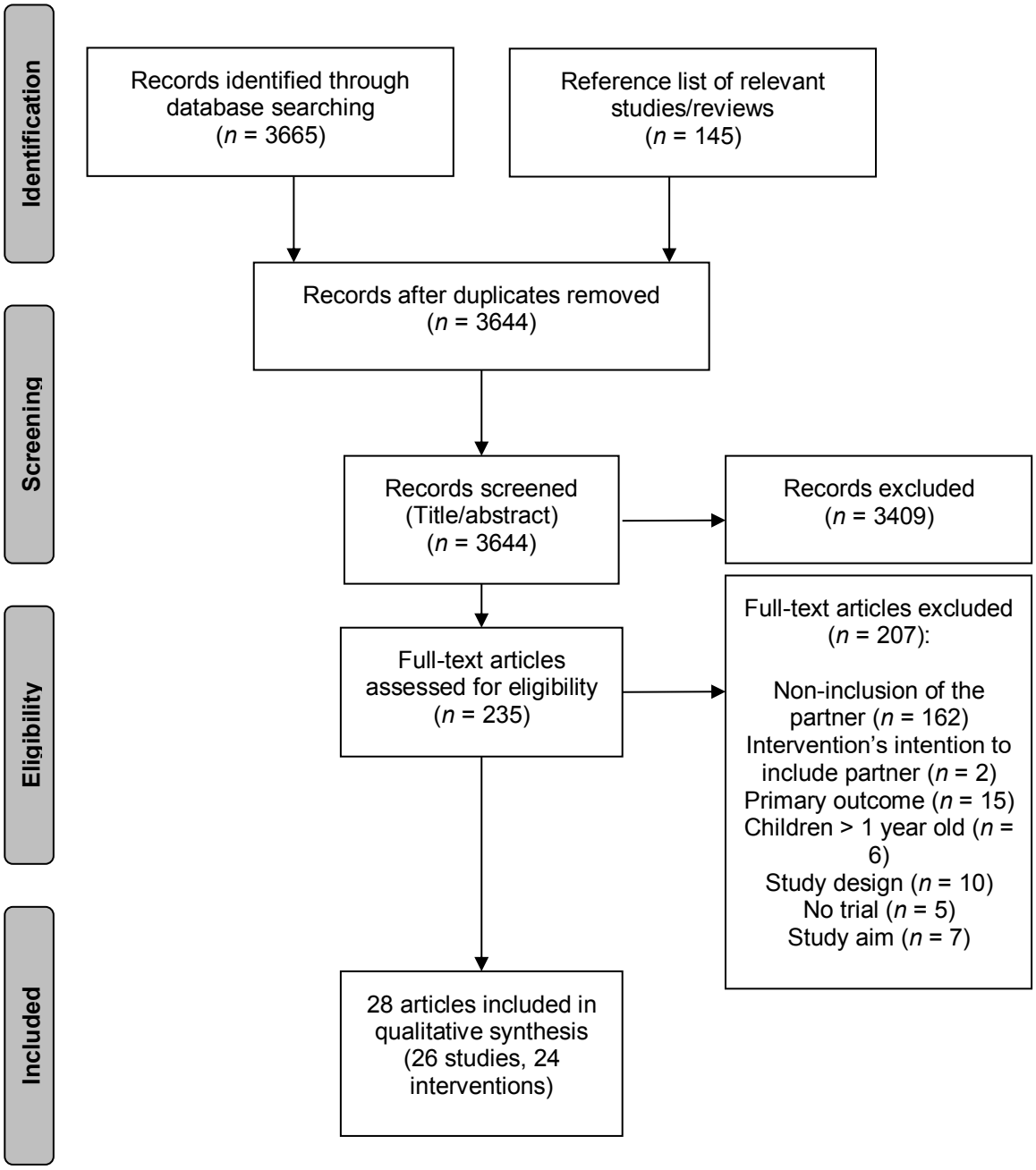

Figure 1 | Flow chart illustrating identification of included studies

The characteristics of the 28 articles included in this systematic review are displayed in Tables 1 through 7. Because of overlapping samples, two preventive (Hayes & Muller, 2004; Hayes, Muller, & Bradley, 2001) and two treatment articles (Mulcahy, Reay, Wilkinson, & Owen, 2010; Reay, Owen, et al., 2012) were considered as one study.

Therefore, a total of 26 studies (13 = prevention studies, Tables 1, 3, 4 and 6; 13 = treatment studies, Tables 2, 3, 5 and 7) were reviewed, which reported on 24 interventions.

Intervention Characteristics

Type of partner participation

The intervention characteristics of the preventive and treatment studies are presented in Tables 1 and 2, respectively. Total participation from partners was allowed in nine preventive interventions (69%), with the exception of three studies where partners were only included in one (Brugha et al., 2000; Elliott et al., 2000) or two (Thomas, Komiti, & Judd, 2014) of the sessions. In one preventive study, this information was unclear. Partial participation by partners was reported in all but one treatment study (Brandon et al., 2012). Partners were invited to participate (with or without women) in between one and four sessions or to attend a part of the intervention specifically directed to them (Chen et al., 2011; Danaher et al., 2013; Hou et al., 2014). In some studies, both partners and other significant persons (Brugha et al., 2000; Buist, Westley, & Hill, 1999; Melnyk et al., 2006; Stamp, Williams, & Crowther, 1995) or family members in general (e.g., partners, extended family; Hayes & Muller, 2004; Hayes et al., 2001; Hou et al., 2014) could participate in the intervention.

Table 1 | Intervention characteristics of included studies assessing preventive interventions for PPD (*n* = 13)

Study (Country)	Sample size	Intervention approach	Study Design	Control type	Prevention timing	Prevention type (Inclusion criteria)	Intervention Format	No. Sessions	Partner participation	Partner/Couple Session(s) Content
Bernard et al., 2011; USA	56	CBT	RCT	TAU	POST	Selected (Prematurity)	Individual	3	Total	CBT-based skills to facilitate the adjustment to neonatal intensive care unit experience.
Brugha et al., 2000; UK	209	CBT	RCT	TAU	ANT	Selected / Indicated (≥1 of the 6 symptoms in modified GHQ-D)	Group	6 + initial meeting + postpartum reunion	Partial	Before the beginning of the intervention, there was an introductory meeting with the woman and her partner. The woman's partner or a "significant other" was encouraged to attend to session 3 with the woman, addressing the topic of postnatal depression (identification, sources of help, importance of social support).
Buist et al., 1999; AUS	44	Education	RCT	TAU	Both	Selected (≥3 risk factors on the screening questionnaire developed by authors)	Group	10	Total	The intervention group, with partners, attended 10 sessions about parenting and coping strategies (e.g., how to deal with a baby's crying). One session focused on PPD education (recognition, where to get treatment, partner's role).
Elliott et al., 2000; UK	99	Psychosocial	CT	TAU	Both	Selected (LQ[a]; CCEI anxiety subscale ≥10)	Group	11	Partial	Partners were invited to attend session 2 with women. Content of the session not reported.
Fisher et al., 2010; AUS	399 couples	Education	CT	TAU	POST	Universal	Group	1 half-day session*	Total	Couples attended the session with their first newborn at Saturday mornings. The two main components addressed baby's behavior management issues (e.g., sleep needs, settling strategies) and readjustment in the intimate relationship (parenthood expectations and

										losses/gains, equality of household and baby-care tasks, and problem-solving strategies).
Hayes & Muller, 2004; AUS ***Hayes et al., 2001; AUS***	206	Education	RCT	TAU	ANT	Universal	Individual (Information booklet)	6 sections	Unclear	Information booklet with 6 categories of information (plus audiotape and midwife guidance) that covered education about emotional changes and ways to get help, designed for pregnant women, their partners, and extended family. Unclear if all of the 5 categories of information were also designed to partners or if only the last one: the sixth category offered information targeted specifically at partners, extended family and friends.
Kozinszky et al., 2012; HUN	1762	CBT IPT Education	RCT	TAU	ANT	Universal	Group	4*	Total	The partners were allowed to attend the sessions with women that covered education about pregnancy/postpartum issues (e.g., breastfeeding) and PPD (e.g., symptoms, risk factors, treatment issues), PPD screening and coping skills (e.g., partner's contribution to childcare, problem-solving and communication skills), help-seeking issues, and relaxation.
Mao et al., 2012; CHIN	240	CBT	RCT	TAU	ANT	Universal	Both	4 group +1 individual	Total	The partners were allowed to attend the sessions with women as "secondary participants". The sessions covered Chinese delivery culture issues and ways of coping, problem-solving and communication skills, cognitive restructuring and relaxation exercises, and ways to improve self-confidence. The individual counseling session allowed the discussion of more intimate concerns between partners (e.g., sexual relationship).

Matthey et al., 2004; AUS	268 couples	Psychosocial	RCT	TAU TAU+ (extra session on "baby play")	ANT	Universal	Group	1*	Total	All couples (3 conditions) received six routine antenatal sessions at evening. Couples were approached to participate at one extra session occurred at week 5 in the TAU+ and empathy conditions. The session in the empathy condition focused on each partner's postpartum concerns and coping strategies to cope with these concerns. Couples also received post-session mail-outs to consolidate the information given in the extra session.
Melnyk et al., 2006; USA	260 families[b]	Education	RCT	Information about hospital services and policies	POST	Selected (Prematurity)	Individual	4	Total	Mothers and fathers (or significant others) received information about: (1) the appearance and behavioral characteristics of preterm infants and how best to parent them; and (2) practical parenting activities specific to the situation (e.g., strategies to assist their infants when stressed).
Milgrom et al., 2011; AUS	143	CBT	RCT	TAU+	Both	Selected/Indicated (EPDS and/or RAC ≥13)	Individual (Workbook+ Phone)	9 units + 8 phone sessions with women	Total	All participants (intervention and control groups) received a community networking pamphlet with contacts for relevant services and an information booklet about perinatal emotional health. The intervention consisted of a single self-help workbook with 9 units for both partners (they were encouraged to share reactions to the material together): Unit 2 was specially designed to partners and covered father–baby relationship issues and Unit 5 covered couple's relationship concerns (e.g., normative relationship changes, communication skills). Expectations about parenting, problem-solving strategies, cognitive and behavioral strategies for coping with depression and anxiety were also covered.

Stamp et al., 1995; AUS	144	Psychosocial	RCT	TAU	Both	Selected (score ≥2 on a modified antenatal screening questionnaire)	Group	3*	Total	Sessions focused on practical and emotional preparation for changes resulting from baby's birth. The postpartum session emphasized mutual support and included a videotape about PPD. A particular aspect of the program was designed to encourage partners to acquire supportive strategies. Specific content was not reported.
Thomas et al., 2014[c]; AUS	48	CBT IPT Education	QE	NA	ANT	Selected/Indicated (Current/emerging depression or anxiety symptoms or past psychiatric history)	Group	6[d]	Partial	Partners attended two sessions with women that covered: (1) parenthood-related changes, education of parental mental health (e.g., mood monitoring and detection of early and late warning signs of depression and anxiety) and coping plans to manage symptoms; (2) couple (e.g., normative relationship changes, communication skills) and father-child relationship concerns.

Note. USA = United States; UK = United Kingdom; AUS = Australia; HUN = Hungary; CHIN = China; CBT = Cognitive-Behaviour Therapy; IPT = Interpersonal Psychotherapy; RCT = randomized controlled trial; CT = controlled trial; QE = quasi-experimental design; TAU = treatment as usual; TAU+ = enhanced treatment as usual; NA = not applicable; POST = postpartum; ANT = antenatal; Both = POST + ANT/ individual + group; GHQ-D = General Health Questionnaire modified; LQ = Leverton Questionnaire; CCEI = Crown Crisp Experiential Index; EPDS = Edinburgh Postnatal Depression Scale; RAC = Risk Assessment Checklist.

* Participants attended the session(s) in addition to standard care (TAU).

[a] Women were classified as vulnerable if they scored two on any one of the vulnerability questions in the LQ or scored 1 on more than one question;

[b] Total sample included 258 mothers and 154 fathers/significant others (81 in the intervention group and 73 in the comparison group). Although 2 mothers choose not to participate, the fathers of those infants were enrolled;

[c] Antenatal intervention delivered to pregnant women with current depressive and anxiety symptoms or at risk of developing PPD;

[d] Of a total of eight groups delivered, the earlier programs comprised five sessions (including one partner session), whilst the last four had six sessions (based on the feedback from women and partners an additional partner session was integrated).

Table 2 | Intervention characteristics of included studies assessing treatment interventions for PPD (*n* = 13)

Study (Country)	Sample size	Intervention approach	Study Design	Control type	Intervention Format	No. Sessions	Partner participation	Partner/Couple Session(s) Content
Brandon et al., 2012[a]; USA	11 couples	PA-IPT	OT	NA	Individual	8	Total	Couple-based intervention that covered IPT strategies, including ways of partners being emotionally and instrumentally supportive and respond to women's needs.
Chen et al., 2011[b]; SING	41	CBT IPT Counseling Education	QE	NA	Individual	NS	Partial	Intervention program considered a second part for partners, which included PPD psychoeducation (e.g., adverse consequences, treatment options), counseling to enhance support to the patient (e.g., facilitating the understanding of PPD, encouraging support), and assessment of partner's needs (brief exploration of partner's coping and counseling on resources available).
Danaher et al., 2013; AUS USA	53	CBT	QE	NA	Individual (Web + Phone)	6	Partial	Separate Partner Support Website about information on PPD, overview of MomMoodBooster Program, and ways to be supportive.
Hou et al., 2014; CHIN	249	CBT SFT	RCT	TAU	Individual	13 CBT + 6 SFT*	Partial	Family therapy content included reconstruction of the mode of interaction (enhancing family relationships and support) among family members (e.g., couples, parents of couples), but it was not clear which person participated.
Lane et al., 2002; AUS	23	CBT	QE	NA	Group	10 + 1 or 2 partner sessions	Partial	One or two partner's (only) evening sessions (content not reported).
Meager & Milgrom, 1996; AUS	20	CBT	RCT	WL	Group	10	Partial	One separate session for partners "to promote a better understanding of PPD and to facilitate change". It was not specified if the session was part of the 10 delivered and if addressed both partners and the women.
Milgrom et al., 2005; AUS	192	CBT	RCT	TAU Counseling	Group	9 + 3 couple sessions	Partial	Partners attended three sessions with women (content not reported).

Milgrom et al., 2015; AUS	45		RCT	Sertraline Sertraline + CBT				
Misri et al., 2000; CAN	29	Education	RCT	Women participation only	Group	7	Partial	Partners attended sessions 2, 4, 6 and 7 (content not reported) with women. The researcher encouraged positive interactions between the couple by focusing on postpartum issues (e.g., involvement in baby-tasks and housework).
Morgan et al., 1997; AUS	34[c]	CBT	QE	NA	Group	8 + couple session	Partial	One evening session conjoint with women at week 6 organized in three parts: 1) introductory meeting, where women shared their difficulties followed by partner's perceptions; 2) meeting with mothers and partners separately; 3) group discussion.
Puckering et al., 2010; UK	20	CBT Education	RCT	WL	Group	14 + 3 partner sessions	Partial	Three evening partner (only) sessions about information on PPD and activities to promote father-baby interactions.
Reay et al., 2006; AUS	18	IPT-Group	QE	NA	Both	2 individual + 8 group + partner session	Partial	Partner (only) evening psychoeducational session about PPD (e.g., symptoms, causes, consequences) and practical and communication strategies to support and respond to women[d].
Mulcahy et al., 2010; AUS	57		RCT	TAU				
Reay et al., 2012 (follow-up)	(50)							

Note. USA = United States; SING = Singapore; AUS = Australia; CHIN = China; CAN = Canada; UK = United Kingdom; PA-IPT = Partner-Assisted Interpersonal Psychotherapy; CBT = Cognitive-Behaviour Therapy; IPT = Interpersonal Psychotherapy; SFT = Systemic Family Therapy; OT = open trial; QE = quasi-experimental design; RCT = randomized controlled trial; NA = not applicable; TAU = treatment as usual; WL = waiting list; Both = individual + group; NS = not specified.

* Participants attended the session(s) in addition to standard care (TAU).

[a] Treatment delivered to pregnant and postpartum women (72.7% and 27.3%, respectively);

[b] Case management model for PPD, with screening and intervention components;

[c] One couple have a child 2-years old;

[d] Additional information retrieved from the descriptive study (Reay, Mulcahy, et al., 2012).

Content of partner/couple session(s)

Among the preventive interventions, the contents addressed in the session(s) were as follows (see Table 1): education about PPD or maternal and paternal mental health during the perinatal period (*n* = 4); coping strategies to deal with depression and anxiety symptoms (*n* = 2); education about, and strategies to cope with, postpartum/parenting concerns (e.g., baby's behavior management, expectations, normative feelings and changes, roles of grandparents and experiences within families of origin) (*n* = 8); father-child relationship issues (*n* = 2); problem-solving strategies (*n* = 4); and couples' relationship concerns such as normative relationship changes (*n* = 3), division of household and baby-care tasks (*n* = 2) and communication skills (*n* = 4). These contents were mostly addressed antenatally (even in the interventions conducted both antenatal and postnatally), which was the delivery timing for preventive interventions that most often emerged. One intervention covered some of these issues at postpartum (e.g., readjustments in the couple's relationship; parenting skills; Fisher, Wynter, & Rowe, 2010), while the remaining postpartum interventions focused on strategies to cope with premature infants/the experience of prematurity (Bernard et al., 2011; Melnyk et al., 2006). Group interventions offered the opportunity for couples to discuss and normalize potential difficulties surrounding the postpartum period (e.g., couples' relationship concerns), to train skills, and to brainstorm activities with other couples (Fisher et al., 2010; Mao, Li, Chiu, Chan, & Chen, 2012; Matthey, Kavanagh, Howie, Barnett, & Charles, 2004; Thomas et al., 2014).

With respect to treatment interventions, the following contents were identified (see Table 2): education about perinatal depression or PPD (*n* = 4) and partner supportive strategies (e.g., emotional and instrumental support and communication skills), namely related to the postpartum period or transition to parenthood issues (e.g., helping with the baby and participating in the housework) (*n* = 6) or to the father-child relationship (Puckering, McIntosh, Hickey, & Longford, 2010). The couple's experience with perinatal depression or postpartum depressive and anxiety symptoms was particularly underscored in two studies (Brandon et al., 2012; Morgan, Matthey, Barnett, & Richardson, 1997). For example, Brandon et al. explored both the women's and partner's perspectives about the experience and stressors of depressive symptoms, the dyadic expectations each holds about the roles of the "mother" and "father", and agreements/disagreements about the women's depressive symptoms at each session.

Methodological Quality

Table 3 displays the methodological quality characteristics of the included studies. Most studies provided sociodemographic information to characterize the participants at baseline. Ten studies reported conducting a power analysis to determine sample size, and an intention-to-treat analysis was mentioned in 13 studies. A modified intention-to-treat analysis was conducted in one study (Mulcahy et al., 2010). The effects of potential confounders (e.g., sociodemographic characteristics, outcome at baseline, and antidepressant medications) were controlled for in the analyses in 11 studies. Half of the studies reported more than one time point assessment at the postpartum/post-intervention. Of the 12 studies that used clinician-administered measures, eight reported that outcome assessors were blinded to group allocation. Most studies indicated the number of participants who dropped-out and/or were loss to follow-up. The reasons for participant's drop-out were specified in seven studies, and the reasons regarding loss to follow-up in six articles. Of the 13 treatment studies, five excluded women who were receiving current antidepressant therapy or other treatments for their postpartum depressive symptoms at the start of the study.

Table 3 | Methodological quality of included studies assessing preventive and treatment interventions for PPD

Study	Sample char	Sample power	ITT	Control	Assess point	Blind assess	Drop-out / Reas	Loss to FU / Reas	Excl curr treat
Preventive studies									
Bernard et al., 2011	+	+	−	+	−	NA	+ / +	+ / +	
Brugha et al., 2000	+	+	+	+	−	+	+ / −	+ / −	
Buist et al., 1999	+	−	−	−	+	NA	− / −	+ / −	
Elliott et al., 2000	−	−	+	−	+	+	+ / −	+ / −	
Fisher et al., 2010	+	+	+	+	−	+	+ / +	+ / −	
Hayes & Muller, 2004	+	+	−	+	+	−	− / −	+ / +	
Hayes et al., 2001	+	+	−	+	+	−	− / −	+ / −	
Kozinszky et al., 2012	+	−	+	+	−	+	− / −	+ / −	
Mao et al., 2012	+	−	+	−	−	+	+ / −	+ / +	
Matthey et al., 2004	+	+	+	+	+	NS	+ / −	+ / −	
Melnyk et al., 2006	+	+	+	+	−	NA	+ / −	+ / −	
Milgrom et al., 2011	+	+	+	+	−	NA	+ / −	+ / −	
Stamp et al., 1995	+	+	+	−	+	NA	+ / −	+ / −	
Thomas et al., 2014	+	−	−	−	−	NA	+ / +	+ / −	
Treatment studies									
Brandon et al., 2012	+	−	−	−	+	+	+ / −	+ / +	+
Chen et al., 2011	+	−	−	−	−	NA	− / −	− / −	+
Danaher et al., 2013	+	−	+	−	+	−	+ / −	+ / −	+
Hou et al., 2014	+	−	−	−	+	NA	− / −	+ / +	−
Lane et al., 2002	−	−	−	−	−	NA	+ / +	+ / −	NS
Meager & Milgrom, 1996	+	−	−	−	−	NA	+ / +	+ / −	−
Milgrom et al., 2005	+	+	+	+	+	NA	+ / −	+ / −	+
Milgrom et al., 2015	+	+	+	+	+	NA	+ / −	− / −	+
Misri et al., 2000	+	−	−	−	+	NS	+ / −	+ / −	−

Morgan et al., 1997	+	−	−	−	+	NA	+ / −	− / −	−
Puckering et al., 2010	−	−	−	−	−	NA	+ / −	+ / −	−
Reay et al., 2006	+	−	+	−	+	+	+ / +	+ / −	−
Mulcahy et al., 2010	+	−	+	−	+	+	+ / +	+ / −	−
Reay et al., 2012	+	−	−	+	NA	NA	NA	+ / +	NA

Note. Sample char = describe sample's characteristics; Sample power = report power analysis; ITT = report intention-to-treat analysis; Control = report control of confounders in data analyses; Assess point = two or more assessment time points; Blind assess = interviewers were blind to group condition; Drop-out/Reas = specify the number of participants who dropped-out/specify the reasons for drop-out; Loss to FU/Reas = specify the number of participants who were loss to follow-up/specify the reasons for loss to follow-up; Excl curr treat = exclusion of women receiving current treatment (e.g., pharmacotherapy, psychotherapy) at baseline; + = yes; − = no; NA = not applicable; NS = not specified.

Assessment Characteristics

Assessment of the partner's mental health

The assessment characteristics of the preventive and treatment studies are presented in Tables 4 and 5, respectively. Six studies (23%) included an assessment of the partner's mental health. Partners were assessed for postpartum depressive symptoms in three preventive studies (Matthey et al., 2004; Melnyk et al., 2006; Milgrom et al., 2011) and three treatment studies (one for perinatal depressive symptoms and two for general mental health; Brandon et al., 2012; Misri et al., 2000; Morgan et al., 1997). In Brandon et al.' study, the partners completed the EPDS-Partner to capture their point of view of the women's depressive symptoms.

Table 4 | Assessment characteristics of included studies assessing preventive interventions for PPD (*n* = 13)

Study	Method of outcome assessment	Outcome measure + Cut-off/Diagnostic criteria	Postpartum assessment timings (weeks)	Women's attendance	Partner/Couple's attendance
Bernard et al., 2011	Self-report	Women: BDI-II	4 weeks after infant's discharge from NICU	26/31 mothers received all 3 sessions.	NS
Brugha et al., 2000	Both	Women: GHQ-D ≥2 EPDS ≥11 SCAN ICD-10	12	42/94 (45%) of the intervention group women (who completed the 3-month assessment) attended 2 or more sessions in addition to session 3.	NS
Buist et al., 1999	Self-report	Women: BDI EPDS	6 24	NS	NS
Elliott et al., 2000	Both	Women: EPDS PSE CCEI SRQ	12 48	18/21 first-time mothers and 15/26 second-time mothers attended an average of 7 and 4 sessions, respectively.	NS
Fisher et al., 2010	Clinician-administrated measure	Women: CIDI[a]	24	120/189 (64%) women attended the session.	Unclear
Hayes & Muller, 2004	Clinician-administrated measure	Women: SADS-M	8-12 16-24	NS	NS
Hayes et al., 2001		Women: POMS			
Kozinszky et al., 2012	Clinician-administrated measure	Women: LQ ≥12	6-8	NS	NS

Mao et al., 2012	Both	Women: PHQ-9 ≥10* EPDS ≥11 SCID (DSM-IV-TR)	6	All participants completed the intervention.	Unclear
Matthey et al., 2004	Both	Women and partner: EPDS (various cut-offs) POMS DIS (DSM-IV) CES-D (partners only)	Women and partner: 6 24		246/268 couples (92%)[b]
Melnyk et al., 2006	Self-report	Women and partner: BDI-II	Women and partner[c]: 8 week's corrected infant age	Unclear	Unclear
Milgrom et al., 2011	Self-report	Women: BDI-II ≥14 Partner: DASS	12	50.7% of women in the intervention group participated in all 8 Phone sessions.	NS
Stamp et al., 1995	Self-report	Women: EPDS > 9 (minor depression) and > 12 (major depression	6 12 24	31% of women attended the three intervention groups.	3/71 (4%) partners attended at least one of the three groups
Thomas et al., 2014	Self-report	Women: CES-D ≥19* EPDS	8	37/48 (77%) women completed at least 80% of the 6 sessions.	28/48 (58.3%) attended at least one partner session

Note. Both = self-report + clinician-administered measures; BDI/BDI-II = Beck Depression Inventory; GHQ-D = General Health Questionnaire modified; EPDS = Edinburgh Postnatal Depression Scale; SCAN ICD-10 = Schedules for Clinical Assessment in Neuropsychiatry using ICD-10 criteria for depressive disorder; PSE = Present State Examination; CCEI = Crown Crisp Experiential Index; SRQ = Self Rating Questionnaire; CIDI = Composite International Diagnostic Interview; SADS-M = Schedule for Affective Disorders and Schizophrenia modified; POMS = Profile of Mood States; LQ = Leverton Questionnaire; PHQ-9 = Patient Health Questionnaire; SCID = Structured Clinical Interview for DSM-IV; DSM-IV/DSM-IV-TR = DSM-IV/DSM-IV-TR depression criteria (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition/Text Revision); DIS = Diagnostic Interview Schedule; CES-D = Center for Epidemiological Studies Depression Scale; DASS = Depression Anxiety Stress Scales short form; NICU = Neonatal Intensive Care Unit; NS = not specified.

[*] Measures administrated after the intervention completion but antenatally;

[a] Diagnosis of Depression or Anxiety or Adjustment Disorder with Depressed Mood, Anxiety, or Mixed Anxiety and Depressed Mood;

[b] Couples attending the extra session in the Empathy (intervention) or Baby Play (TAU+) conditions, or the Control session in which PPD was discussed.

[c] Follow-up data collection occurred at each of the session II through IV session interventions (2-4 days after the first session, 1-4 days before infant discharge from the NICU, and 1 week post–NICU discharge, respectively), before the interventions.

Table 5 | Assessment characteristics of included studies assessing treatment interventions for PPD (*n* =13)

Study	Treatment inclusion	Method of outcome assessment	Outcome measure + Cut-off/Diagnostic criteria	Post-intervention assessment timings (weeks)	Women's attendance	Partner/Couple's attendance
Brandon et al., 2012	DSM-IV + HAM-D ≥16	Both	Women: HAM-D > 9 EPDS > 12* Partner: HAM-D > 9 EPDS-P*	0 6-8		10/11 couples (100%)[a]
Chen et al., 2011	EPDS ≥13 or ≥1 yes in one of the 3 add questions (infanticide impulses, psychotic symptoms)	Self-report	Women: EPDS ≥13	24 weeks post-enrollment or at discharge.	NS	NS
Danaher et al., 2013	PHQ-9 10-19 or EPDS 12-20	Both	Women: PHQ-9 HRSD	12 and 24 weeks post-enrollment.	46/53 (87%) women completed all 6 sessions.	18/53 (34%)
Hou et al., 2014	DSM-IV-TR	Self-report	Women: EPDS	0 6, 12, 18, 24 months postpartum.	NS	NS
Lane et al., 2002	NS	Self-report	Women: EPDS	0	18/23 (78%) women completed the intervention.	NS
Meager & Milgrom, 1996	EPDS >12 + BDI > 15	Self-report	Women: EPDS BDI POMS	0	6/10 (40% attrition) women completed the 10 sessions.	NS

Milgrom et al., 2005	EPDS ≥12 + DSM-IV	Self-report	Women: BDI ≥17	0 48	107/159 (67%) women allocated to the three psychological interventions attended the respective intervention.	NS
Milgrom et al., 2015	EPDS ≥13 + DSM-IV	Self-report	Women: BDI-II ≥13	12 and 24 weeks post-enrollment.	Women completed an average of 10.6 sessions and all completed at least half of the sessions (CBT condition)	NS
Misri et al., 2000	DSM-IV + EPDS ≥12	Both	Women: EPDS MINI (DSM-IV) SQ Partner: GHQ	0 4	29/29 (100%) women attended all sessions.	NS
Morgan et al., 1997	EPDS ≥13	Self-report	Women: GHQ EPDS ≥13 Partner: GHQ ≥7/8[b]	0 24 weeks (only for the last 4 groups)[c]	Only one woman dropped-out; attendance at the sessions was at a level of 90%.	21/29[d] (72%)
Puckering et al., 2010	EPDS > 10	Self-report	Women: EPDS	0	11/12 women attended the intervention group.	NS
Reay et al., 2006	EPDS ≥13 + DSM-IV	Both	Women: EPDS BDI HAM-D ≥ 8	0 12	17/18 (94%) women attended the intervention.	14/18 (78%)

Mulcahy et al., 2010	DSM-IV + HAM-D ≥14	Both	Women: EPDS ≥13 BDI-II HAM-D ≥ 8	0 12	22/29 (76%) women attended the intervention.	NS
Reay et al., 2012 (follow-up)		Self-report	EPDS ≥13 BDI-II	2-year post-intervention.		

Note. DSM-IV/DSM-IV-TR = DSM-IV/DSM-IV-TR depression criteria (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition/Text Revision); HAM-D/HRSD = Hamilton Rating Scale for Depression; EPDS = Edinburgh Postnatal Depression Scale; EPDS-P = Edinburgh Postnatal Depression Scale – Partner; PHQ-9 = Patient Health Questionnaire; NS = not specified; BDI/BDI-II = Beck Depression Inventory; Both = self-report + clinician-administered measures; POMS = Profile of Mood States; MINI = MINI-International Neuropsychiatric Interview; SQ = (Kellner) Symptom Questionnaire; GHQ = General Health Questionnaire; Y = efficacious; N = Not efficacious.

* Measures administrated during the intervention before each session;

[a] Couples attending all the sessions (one couple excluded because of the presence of partner violence; attendance 100%);

[b] Partners assessed "in the last three joint sessions" at week 6;

[c] 48 weeks (12 months) follow-up for the first group and 36 weeks (9 months) for the second group;

[d] Because couple's session was run from the second group onwards (of a total of six groups), only 21 out of 29 partners attended the session.

Assessment of the partner's attendance

Data about the partner's attendance were reported in seven studies (27%). Regarding the preventive studies, one study found poor engagement of partners in the sessions (attendance = 4%; Stamp et al., 1995), and in two studies, the partner's session attendance rate was above 50% (Matthey et al., 2004; Thomas et al., 2014) (see Table 4). In one study, this information was unclear (Melnyk et al., 2006), and in two other studies, it was unclear if the attendance reported was for the women only or for both the women and their partners (Fisher et al., 2010; Mao et al., 2012). Regarding the treatment studies, poor engagement of the partners in the intervention was found in one study (attendance = 34%; Danaher et al., 2013), whereas in the remaining three studies, the majority of partners participated (Brandon et al., 2012; Morgan et al., 1997; Reay et al., 2006) (see Table 5).

Intervention Outcomes

Effects of the partner's participation in the women's response to the interventions

The intervention outcomes of the preventive and treatment studies are presented in Tables 6 and 7, respectively. Matthey et al. (2004) found that, in comparison with other two groups, a joint session with partners about psychosocial issues was particularly effective in promoting the early postpartum emotional adjustment of women with low self-esteem (see Table 6). Moreover, the authors observed a significant and positive impact of this session (empathy condition) on the male partners' understanding of the women's experience of motherhood at 6 weeks postpartum, that is, the partners of these women were significantly more aware of what their spouses are experiencing than the partners of women with low self-esteem who did not attend the selected extra session. This was observed in the lower discrepancy scores between partner's ratings of women's experience of motherhood and the women's ratings of their own experience. Therefore, the authors suggested that the better outcomes for those women with low self-esteem were related to their partners' increased awareness of what the women were experiencing. Of the two treatment studies that assessed the effects of including the partner in the women's response to the intervention (see Table 7), one study found that a more rapid recovery in the woman was related to the partner's involvement (Misri et

al., 2000). Compared to women whose partners did not participate in any of the psychoeducational sessions (CG), women who attended four selected sessions with their partners (intervention group) reported significantly lower levels of postpartum depressive symptoms one month after the end of the intervention, suggesting that the partner's support plays an important role in the treatment of women's PPD. On the other hand, Morgan et al. (1997) observed overall significant reductions in PPD symptoms among participating women, but stressed that there were no significant differences between women whose partners attended the couples' session and those whose partners did not attend regarding their levels of depressive symptoms, at any assessment-points.

Table 6 | Intervention outcomes of preventive interventions for PPD (*n* = 13)

Study	Efficacy of the intervention on women's depressive symptoms	Relevant information about partner (for this review)
Bernard et al., 2011	Women in the intervention group tended to report marginally significant lower levels of depressive symptoms at follow-up in comparison with those in the CG (p = 0.06).	Since few partners choose to participate in the study, only data on mothers were presented. No objective information was given about partner's attendance.
Brugha et al., 2000	No significant differences in the percentage of women with clinically significant depressive symptoms between intervention group and CG at 12 weeks postpartum.	
Buist et al., 1999	No significant differences in depressive symptoms between intervention group and CG at both assessment time points. No significant change over time within groups.	
Elliott et al., 2000	First-time mothers in the intervention group reported significantly lower levels of depressive symptoms in comparison with those in the CG at 12-weeks postpartum (effects no longer present at 48 weeks postpartum). A significantly lower percentage of first-time mothers in the intervention group experienced clinically significant depressive symptoms during the first 2 months postpartum.	
Fisher et al., 2010	Women without psychiatric history in the intervention group were significantly less likely to experience the onset of Depression or Anxiety or Adjustment Disorder in comparison with those in the CG at 24 weeks postpartum.	
Hayes & Muller, 2004	No significant differences in changes in depressive symptoms from pre- to postpartum assessment time points between intervention group and CG.	
Hayes et al., 2001	Significant improvements in depressive symptoms from pre- to postpartum assessment time points within both groups, but no significant differences in improvement were found between intervention group and CG.	
Kozinszky et al., 2012	Women in the intervention group reported significantly lower levels of depressive symptoms, and were less likely to experience PPD, in comparison with those in the CG at 6-8 weeks postpartum.	

Mao et al., 2012	Women in the intervention group reported significantly lower levels of depressive symptoms, and were less likely to experience PPD, in comparison with those in the CG at 6-weeks postpartum.	
Matthey et al., 2004	Women with low self-esteem in the intervention group (empathy condition) reported significantly lower levels of depressive symptoms at 6 weeks postpartum in comparison with those in the two CG (effects no longer present at 24 weeks postpartum). There were no significant differences in the percentage of low self-esteem women with clinically significant depressive symptoms between conditions at both assessment time points.	The results of these women were related to their partners' increased awareness of what the women were experiencing. These women also reported, at 6 weeks postpartum, a higher satisfaction with the sharing of baby and home-related tasks. No significant impact of the intervention on partner's depressive symptoms was found.
Melnyk et al., 2006	Women in the intervention group reported significantly lower levels of depressive symptoms in comparison with those in the CG at 8 weeks' corrected infant age.	No significant differences in depressive symptoms between partners/significant others in the intervention group and those in the CG.
Milgrom et al., 2011	Women in the intervention group reported significantly lower levels of depressive symptoms in comparison with those in the CG at 12-weeks postpartum. A significantly lower percentage of women in the intervention group experienced clinically significant depressive symptoms following intervention.	Most partners (intervention: *n* = 16, CG: *n* = 8) did not complete follow-up assessment and 14% women were single. Although partners in the intervention group scored lower in postpartum depressive symptoms in comparison to those in the CG, no significant differences were found between the groups.
Stamp et al., 1995	No significant differences in the percentage of women with clinically significant depressive symptoms between intervention group and CG at all assessment time points.	
Thomas et al., 2014	Significant improvements in depressive symptoms among women from pre- to post-intervention (antenatal period), and up to 2-months postpartum.	The feedback reported by 21 partners (75%) about their participation was highly positive, underscoring a better understanding of parental mental health issues and resources available to their family. 67% said they would recommend the program to other fathers. The authors intended to assess the benefits perceived by women from partner's attendance but no data were reported in the article.

Note. CG = control group.

Table 7 | Intervention outcomes of treatment interventions for PPD (*n* =13)

Study	Efficacy of the intervention on women's depressive symptoms	Relevant information about partner (for this review)
Brandon et al., 2012	Significant improvements in depressive symptoms from pre- to post-intervention, which were maintained at 6/8-weeks follow-up. By the end of the intervention, 90% (9/10) of the women meet criteria for clinical response (HAM-D = 9), and at 6/8-weeks follow-up 8 of these 9 women met criteria for symptomatic recovery.	Partner's depressive symptoms remained low from intake to the end of the intervention (except in one partner). One of the two partners that met criteria for past episodes of Major Depressive Disorder experienced symptom recurrence over the course of the acute phase. Women and their partners reported some benefits from participating in the intervention, and the authors observed a better recognition of women's depressive symptoms by their partners at the end of the intervention.
Chen et al., 2011	Significant improvements in depressive symptoms from pre- to post-enrollment assessment in 78% (32/41) of women (EPDS < 13).	
Danaher et al., 2013	Significant improvements in depressive symptoms from pre- to 12 weeks post-enrollment and to 24-weeks follow-up. 90% (26) of the 29 women who met PHQ-9 criteria for minor or major depression at baseline did not report these criteria anymore at 12 weeks post-enrollment.	
Hou et al., 2014	Women in the intervention group reported significantly lower levels of postpartum depressive symptoms in comparison with those in the CG following intervention. Observed improvements in depressive symptoms from pre- to different post-intervention time points in both groups, but significantly greater among women in the intervention group.	
Lane et al., 2002	Significant improvements in depressive symptoms from pre- to post-intervention.	The authors mentioned higher partner attendance without reporting objective information. Partners reported benefits (not specified) from participating in the intervention.
Meager & Milgrom, 1996	Significant improvements in depressive symptoms among women in the intervention group from pre- to post-intervention, with these women reporting significantly lower levels of depressive symptoms in comparison with those in the CG following intervention.	

Milgrom et al., 2005	Women who received psychological interventions (CBT and counseling) reported significantly lower levels of postpartum depressive symptoms in comparison with those in the standard care group following intervention. More than 50% of these women (vs. 29% in the standard care group) reported minimal levels of depression (BDI-II < 17). Follow-up data were too scarce to adequate analyses.	
Milgrom et al., 2015	CBT mono-therapy and sertraline mono-therapy were found to be superior at 12 weeks post-enrollment to combination therapy in reducing depressive symptoms. Within the CBT mono-therapy group, the percentage of women reporting minimal levels of depression (BDI-II < 13) was significantly higher at 24 weeks follow-up compared to pre-intervention.	
Misri et al., 2000	Women in the support group (partners involved) reported significantly lower levels of postpartum depressive symptoms in comparison with those in the CG (partners not involved) at 1 month post-intervention. 81% (13) of the 16 women in the support group who met MINI criteria for major depression at baseline did not report these criteria anymore at 1 month post-intervention (vs. 39% in the CG).	Higher data completion at assessment time points from partners. Partner's general mental health was higher among those involved in treatment than those who did not (CG) at both assessment time points. Women in the support group reported significantly higher levels of dyadic adjustment in comparison with those in the CG following intervention.
Morgan et al., 1997	Significant improvements in depressive symptoms from pre- to post-intervention. Any women scored above the cut-off score on the EPDS at follow-up.	There were no significant differences in women's outcomes based on the partner's participation in the couple's session. 8/14 men scored in the GHQ distressed range, and 6 of them had a partner who scored above the EPDS cut-off score. Women and their partners reported some benefits from participating in the joint session.
Puckering et al., 2010	Significant improvements in depressive symptoms among women in the intervention group from pre- to post-intervention, with these women reporting significantly lower levels of depressive symptoms in comparison with those in the CG following intervention.	The authors mentioned higher partner attendance without reporting objective information.
Reay et al., 2006	Significant improvements in depressive symptoms from pre- to post-intervention, which were maintained at 12-weeks follow-up. By the end of the intervention, 50% of the women fully remitted (HAM-D < 8).	

Mulcahy et al., 2010	Significant improvements in depressive symptoms from pre- to post-intervention in both groups, but significantly greater among women in the intervention group, who reported significantly lower levels of postpartum depressive symptoms compared to those in the CG (differences between groups persisted at 12-weeks follow-up). A significantly higher percentage of women in the intervention group met criteria for recovery following intervention (EPDS < 13 and HAM-D < 8).
Reay et al., 2012 (follow-up)	Mothers who received IPT-G were less likely to develop persistent depressive symptoms in the long-term and to require treatment during the 2-year follow-up.

Note. HAM-D = Hamilton Rating Scale for Depression; EPDS = Edinburgh Postnatal Depression Scale; PHQ-9 = Patient Health Questionnaire; CG = control group; CBT = Cognitive-Behaviour Therapy; BDI-II = Beck Depression Inventory-II; MINI = MINI-International Neuropsychiatric Interview GHQ = General Health Questionnaire; IPT-G = Interpersonal Psychotherapy-group.

(Other) benefits of the partner's participation

Some benefits of the partner's participation in the intervention, either as perceived by the couples or as observed by the authors, were reported in the included studies (see Tables 6 and 7). In some studies, women and/or their partners were asked to provide feedback about their participation and experience in the interventions delivered. Partners expressed some benefits associated with their attendance to the session(s), such as a higher understanding of their spouse's mental health difficulties (e.g., emotional changes, warning signs and how to access help; Morgan et al., 1997; Thomas et al., 2014), the opportunity to express their own experiences of coping with the women's depression (Brandon et al., 2012) and to normalize those experiences by sharing them with other men (Morgan et al., 1997). One couple expressed a higher appreciation of each other's efforts to help (Morgan et al., 1997). Women indicated a more effective communication of their needs (Brandon et al., 2012) and a higher support received from their partners (Morgan et al., 1997) as a result of these couple-based session(s), and more positive appraisals of the couple's relationship were observed among women who participated in the intervention with their partners (Misri et al., 2000). In addition, the authors observed that the partners recognized better the women's depressive symptoms by the end of the intervention (i.e., partner's ratings of the intensity of women's depressive symptoms demonstrated a higher agreement with women's ratings of their own depressive symptoms) (Brandon et al., 2012) and understood better the women's experience of motherhood, as indicated by a higher accuracy between partner's ratings of women's experience of motherhood and the women's ratings of their own experience (Matthey et al., 2004). Finally, the mental health of some of the partners involved has also improved as a result of their participation (Misri et al., 2000). No study reported negative outcomes or adverse events associated with partner's inclusion (that have at least been assessed).

Discussion

The aim of this systematic review was to summarize the research findings on partner-inclusive interventions designed to prevent or treat PPD. The number of interventions in this review indicates that there is considerable interest in including the partner in interventions designed to prevent or treat women's PPD. However, little information was provided about the partner's specific participatory behaviors during the interventions, except when delivered in a group format with other couples. In addition,

there was little information on how partners have been used (if applicable) as a resource to improve the efficacy of the intervention. Moreover, in general, missing details about the partners' attendance did not allow us to understand if the authors did not report the data because very few of them actually participated and the services are still mostly mother-centered, or if they actually participated. Providing information on the number of partners who attend the interventions is therefore critical to better understand the feasibility and acceptability of their inclusion, and to define practical strategies to increase their engagement.

Despite the evidenced efforts to maximize the participation of the partners (e.g., session scheduled on Saturday morning and courtesy phone-call; Fisher et al., 2010; Mulcahy et al., 2010), the effects of the partner's participation on women's intervention outcomes were rarely assessed. The minimal available data supports the partner's involvement in the prevention (Matthey et al., 2004) and recovery (Misri et al., 2000) of women's PPD, at least in the short-term. The exception was the study by Morgan et al. (1997), where the results did not seem to support the influence of the partner's participation on the women's response to the intervention. Nevertheless, some positive benefits related to their joint participation were observed in, or expressed by, women and their partners (Brandon et al., 2012; Matthey et al., 2004; Misri et al., 2000; Morgan et al., 1997; Thomas et al., 2014). In the reviewed studies, it was difficult to identify which component was the potential active mechanism underlying the efficacy of the intervention on the positive adjustment of some women, e.g., the partner's inclusion, the content addressed, or the combination of both. Mao et al. (2012) have suggested that the outcomes of the intervention may be associated with both participation of the partner and the learning activities provided at the session. Along with the observed beneficial effect in the preventive (Fisher et al., 2010; Matthey et al., 2004) and treatment (Brandon et al., 2012; Morgan et al., 1997) couple-based sessions, the combination of these two factors deserves further attention.

The content of the sessions was consistent with the evidence-based recommendations for father-inclusive antenatal education programs (e.g., psychoeducation about relationship changes, the motherhood experience, and partner supportive strategies; May & Fletcher, 2013), the relevance of partner-related skills in the prevention of perinatal depression and anxiety (Pilkington et al., 2016), and specifically, the need to address men's literacy about perinatal mental health (Fonseca & Canavarro,

2017; Letourneau et al., 2012). Accordingly, a higher awareness about perinatal emotional issues and women's experience of motherhood seem to be achieved in the reviewed interventions (Brandon et al., 2012; Matthey et al., 2004; Morgan et al., 1997; Thomas et al., 2014). However, understanding how partner's inclusion potentially influences women's responses to the intervention (i.e., the potential mediating processes) remains unknown. For example, the reviewed studies did not explore how the perceived benefits of the interventions could translate into mental health benefits for women (and their partners). Moreover, few studies addressed the partner's mental health and did not find a significant effect of the intervention on their outcomes, which may be because the interventions were primarily designed to address women's depressive symptoms. It is of note, however, that when the interventions were delivered specifically to the partners of women with PPD, positive effects on the men's depressive symptoms were found (e.g., Davey, Dziurawiec, & O'Brien-Malone, 2006).

Directions for Future Research

Because important gaps have been found in the reviewed studies, this systematic review suggests important directions for future research. Additional research using already developed interventions would benefit from a comparison of the outcomes of the same intervention delivered to women only vs. to women and their partners (including same-sex couples, as highlighted in others reviews; e.g., Pilkington, Whelan, et al., 2015). This would generate a complete understanding about the core intervention elements (i.e., the partner's inclusion vs. the contents addressed) underlying the effectiveness of the intervention.

Moreover, it would be of value to examine the effects of the partner's participation on additional dyadic, parental and infant developmental outcomes. Beyond the well-documented evidence of the role of the partner's support in preventing (Pilkington, Milne, et al., 2015) and helping women to recover from PPD (Misri et al., 2000), research also supports its important role in improving positive appraisals of the couple's relationship (Misri et al., 2000), reducing maternal parenting stress (Sampson, Villarreal, & Padilla, 2015), and contributing to less distressed child's temperament (Stapleton et al., 2012). Therefore, because most of the interventions reviewed endorsed fostering partner's supportive strategies, this suggests some benefits of partner-inclusive interventions at multiple levels. Similarly, problem-solving and communication skills were commonly

addressed in the interventions reviewed. The partner's participation may facilitate the practice of these skills (Mao et al., 2012), which could help to promote the couple's relationship quality (Shapiro & Gottman, 2005) as well as positive co-parenting and parent-child relationships (Feinberg & Kan, 2008). Although some of the included studies were also interested on the effect of the intervention on relationship outcomes, the assessment of the specific contribution of the partner's inclusion on these outcomes was generally neglected. Finally, because men also may experience PPD and couple's comorbidity is common (Cameron et al., 2016; Goodman, 2004), their involvement would probably be helpful for their own well-being (Misri et al., 2000), for example, by helping them to learn strategies to cope with their own depressive symptoms. Accordingly, the assessment of both partners' mental health is of unquestionable importance. Future research should consider assessing the effects of partner's involvement on multiple outcomes in order to inform clinical practice about the wide potential benefits of their inclusion in the interventions directed to prevent or treat women's PPD. This would allow a clarification of the mechanisms (e.g., improvement of the partner's mental health and improvement of the couple's communication) through which the partner's inclusion in the interventions may possibly impact the women's outcomes. Additionally, analyzing potential moderators (e.g., the type of partner participation) is important to better understand under what circumstances the partner's inclusion effects might be enhanced.

Efficacy studies of web-based approaches to prevent PPD with a partner component, as recently described (e.g., Haga, Drozd, Brendryen, & Slinning, 2013), are also of the upmost importance because they may be a suitable context to promote the partner's inclusion with less time and work constraints. Although poorer partner attendance was reported in the web-based intervention included in this review (Danaher et al., 2013), a recent RCT conducted by Milgrom et al. (2016) indicated that most partners accessed the partner support website (n = 16/21; 76%). Finally, the focus of our review is on the benefits of the partner's inclusion; however, the involvement of significant others might be preferable for some women (e.g., single mothers). It is of note that involving partners in some interventions may be contraindicated, e.g., in the presence of intimate violence (Brandon et al., 2012). In line with this, futures studies should also provide information about the safety of including partners in the interventions. Further attention as to the specific women and circumstances that PPD partner-inclusive interventions are most appropriate and effective is needed.

Strengths and Limitations

The strengths of the present systematic review include a thorough search strategy, which was developed in line with the PRISMA statement and provides transparency about how the articles were analyzed to allow for replication. Our review extends the existing literature by including and synthetizing information about a wide range of partner-inclusive interventions, regardless of the approach (e.g., CBT and IPT) and type (both preventive and treatment approaches). Although there are some reviews on the effectiveness of PPD prevention and treatment, to date, this question has not been systematically addressed. Finally, the studies were analyzed according to diverse parameters beyond efficacy indicators, which allowed for the recognition of the current gaps that compromise a better understanding of the partner's role in this field and therefore need to be overcome in future research.

The present review is not without limitations. First, the considerable heterogeneity of the reviewed studies and their mixed quality (e.g., methodological limitations such as the small sample size and absence of long-term follow-up) restricted the interpretation of the findings. Second, we conducted a qualitative analysis of the studies without a quantitative synthesis. This is justified, however, because of the heterogeneity across studies (e.g., assessment measures, postpartum/post-intervention assessment time points and cut-off scores) and the missing information on the main characteristics assessed in the reviewed studies. Finally, we were unable to access the full-text of eight articles (no response to our request or no contact information for the authors).

Clinical Implications

Psychoeducation about emotional changes during the perinatal period and open discussions about shared perinatal concerns may be particularly important to overcome a sense of helplessness often reported by couples to deal with disturbing emotional experiences. A short participation period of both members of the couple in preventive interventions (1-2 sessions) may offer the possibility of sharing knowledge and practicing coping skills between each member of the couple and with other couples. Regarding the treatment interventions, the role of the partner as an "assistant" in facilitating behavior changes in women with PPD may be of particular relevance (Brandon et al., 2012). Finally,

interventions approaching couples as a unit of the intervention might be an opportunity to directly address the mental health of both partners.

Conclusions

Despite the strong arguments of why including partners could be important in interventions for PPD, our review indicates that no conclusions can be made regarding whether a specific type of partner participation is associated with the efficacy of the intervention. This is a serious limitation in this field, and consequently, practical recommendations about the benefits of including partners in PPD interventions are still limited. However, the involvement of partners may lead to the improvement of important issues related to the onset and/or maintenance of PPD. Additional research, including well-powered trials, is warranted to clarify whether partner's inclusion is related to the (in)efficacy of the intervention to prevent and/or treat PPD – elucidating *how* and *for whom* – as well as to better inform health policy strategies.

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Supplementary Material

Table S1 | PRISMA checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3-6
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	6
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	6
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	6-7
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	6-7
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	6-7

Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	9-10
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	9-10
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	8-9
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	8-9
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	10 (qualitative)
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	10 (qualitative)
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	Not applicable
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	Not applicable
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	10 Figure 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Tables 1-2; 4-5
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	12 Table 3
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Tables 1-2; 4-7

Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	10-14
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	Not applicable
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	Not applicable
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	14-16
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	17-18
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	16-18
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	Funding

Chapter IV

General Discussion

This research project aimed at providing innovative contributions to two specific domains in the field of the transition to parenthood: the prediction of PPD among Portuguese women (research phase I) and the role of DC for partners' perinatal adjustment (research phase II). A link between *hers* and *theirs* perspectives was also accomplished by conducting a systematic review of the literature on partner-inclusive interventions to address PPD in women (research phase III). This final chapter entails a brief summary and comprehensive discussion of the main results of this project, highlighting its strengths and limitations as well as its implications for future research and clinical practice. To avoid overlapping this general discussion with each individual study discussion, it will be presented here only the main findings obtained in each study as well as general critical comments.

1. Summary of the main findings

The **first phase** of this research project intended to contribute to the validation of the PDPI-R – an inventory of risk factors for PPD – among Portuguese women, including the establishment of cut-off scores to identify those women at higher risk for developing PPD in Portugal (**empirical studies I** and **II**). The main findings of these studies indicated that:

i. In total, 16.4% (Study II) to 27.5% (Study I) of Portuguese women presented clinically relevant depressive symptoms (EPDS ≥ 10) during the first two months postpartum, and 23.2% presented it between six and nine months postpartum. Totally, 4.3% of the women met criteria for a major depressive episode at three months postpartum;

ii. The most relevant psychosocial factors **assessed prenatally** were previous depression, prenatal depression, low socioeconomic status, unintended pregnancy, and the most relevant psychosocial factors **assessed postnatally** were previous depression, prenatal depression and anxiety, lack of social support, maternity blues, and life stress events; Table 1 summarizes the main risk factors assessed prenatally and postnatally by gold standards;

iii. The PDPI-R showed satisfactory **reliability** and **convergent and construct validity**, discriminating between depressed and non-depressed postpartum women;

iv. The postnatal version was more sensitive and specific than the prenatal version (detecting an average of 82% vs. 71% of cases with PPD or symptoms thereof), and both versions were more accurate in identifying clinical diagnoses of PPD than positive EPDS screens; the predictive validity of the PDPI-R was very similar in identifying positive EPDS screens in the short and long-term (see Table 1);

v. Based on the best relationship between sensitivity and specificity, different cut-off scores were recommended depending on the instrument used to determine clinical postpartum depressive symptoms (self-report vs. psychiatric interview); those cut-offs are summarized in Table 1.

Table 1 | Recommended cut-off scores for the PDPI-R and main risk factors, by gold standard

	Clinical postpartum depressive symptoms		
PDPI-R	EPDS ≥10 (6 weeks)	Clinical diagnosis (3 months)	EPDS ≥10 (6-9 months)
Prenatal version			
Cut-off score	**3.5**	**4.5**	**3.5**
Sensitivity	56.5%	83.3%	60.9%
Specificity	71.8%	85.8%	71.1%
Risk factors	Prenatal depression Previous depression	Prenatal depression	Previous depression Low socioeconomic status Unintended pregnancy
Postnatal version			
Cut-off score	**5.5**	**9.5**	**4.5**
Sensitivity	76.8%* - 65.2%	83.3%	78.3%
Specificity	73.0%* - 80.3%	94.8%	67.1%
Risk factors	Prenatal anxiety Previous depression Maternity blues Life stress events	Lack of social support Life stress events	Prenatal depression Prenatal anxiety

Note. PDPI-R = Postpartum Depression Predictors Inventory-Revised; EPDS = Edinburgh Postnatal Depression Scale.

* Values obtained in Study I.

The **objectives** of the **second phase** aimed at providing a better understanding of the role of DC underlying both women's and men's adjustment during the perinatal period. Four empirical studies were conducted (one cross-sectional and three longitudinal), which yielded the following main findings:

i. Adjustment and dyadic coping over time

Adjustment outcomes

- In approximately 20% (57/289) of couples, the woman had higher levels of depressive symptoms during pregnancy, of which 39% (22/57) had a partner with high depressive symptoms themselves (couple's comorbidity) (Study III);
- Overall, multiparous couples reported declines in psychological symptoms and increases in QoL over the second trimester of pregnancy until six weeks postpartum, while primiparous couples experienced an opposite trajectory (Study IV);
- Women reported more parental confidence than men at six weeks and between six and nine months postpartum (Study V);
- Both partners' parenting stress decreased and parental confidence increased from six weeks to six and nine months postpartum (Study V);

Dyadic coping

- Women communicated more stress than men during pregnancy (Study III), and men's stress communication decreased from pregnancy to six weeks postpartum (Study IV);
- Both partners' perceptions of common DC decreased from pregnancy to six weeks postpartum (Studies IV and V);
- Members of a couple were, on average, more similar than dissimilar/complementary regarding their DC strategies to help the other cope with stress (Study VI);
- Each partner's perceived similarity and couples' actual similarity were stable from pregnancy to six weeks postpartum (Study VI).

ii. Interpersonal context of depression during pregnancy (Study III)

Significant differences were found in couple's DC strategies and dyadic adjustment according to **women's levels of depressive symptoms**: Couples with a woman with high depressive symptoms presented less supportive (enacted by oneself and by partner) and common DC and more negative DC (enacted by oneself and by partner), and less satisfaction, cohesion, consensus and overall dyadic adjustment, than couples with a woman with no/minimal depressive symptoms; these difficulties were exacerbated in situations in which both partners showed high depressive symptoms.

iii. Longitudinal associations between DC forms and own and partner's adjustment

Common findings for women's and men's outcomes

- Common DC during pregnancy positively predicted QoL at six weeks postpartum (Study IV);
- Decreases in common DC were associated with increases in internalizing symptoms and decreases in QoL over time (Study IV);
- Common DC mediated the association between the partner's attachment-related avoidance and parental confidence: higher avoidant attachment representations during pregnancy were associated with decreases in common DC over time which, in turn, reduced the other partner's confidence in the parental role (Study V);
- Perceived similarity in DC during pregnancy positively predicted internalizing symptoms controlling for stereotype effects (Study VI);
- Perceived similarity in DC at six weeks postpartum negatively predicted the other partner's internalizing symptoms and parenting stress controlling for stereotype effects (Study VI).

Women's outcomes

- Women's positive DC during pregnancy positively predicted their internalizing symptoms at six weeks postpartum (Study IV);
- Common DC mediated the association between the partner's attachment-related avoidance and parenting stress: men with higher avoidant attachment

representations during pregnancy engaged less in common DC over time which, in turn, increased women's stress in the maternal role (Study V).

Men's outcomes

- Women's stress communication during pregnancy positively predicted men's internalizing symptoms at six weeks postpartum (Study IV);
- Common DC mediated the association between attachment-related avoidance and parental confidence: men with higher avoidant attachment representations during pregnancy engaged less in common DC over time which, in turn, increased their own confidence in the paternal role (Study V).

Figure I summarizes the main findings of the longitudinal associations between DC and adjustment outcomes considering the mutual influences between partners over time (Studies IV to VI).

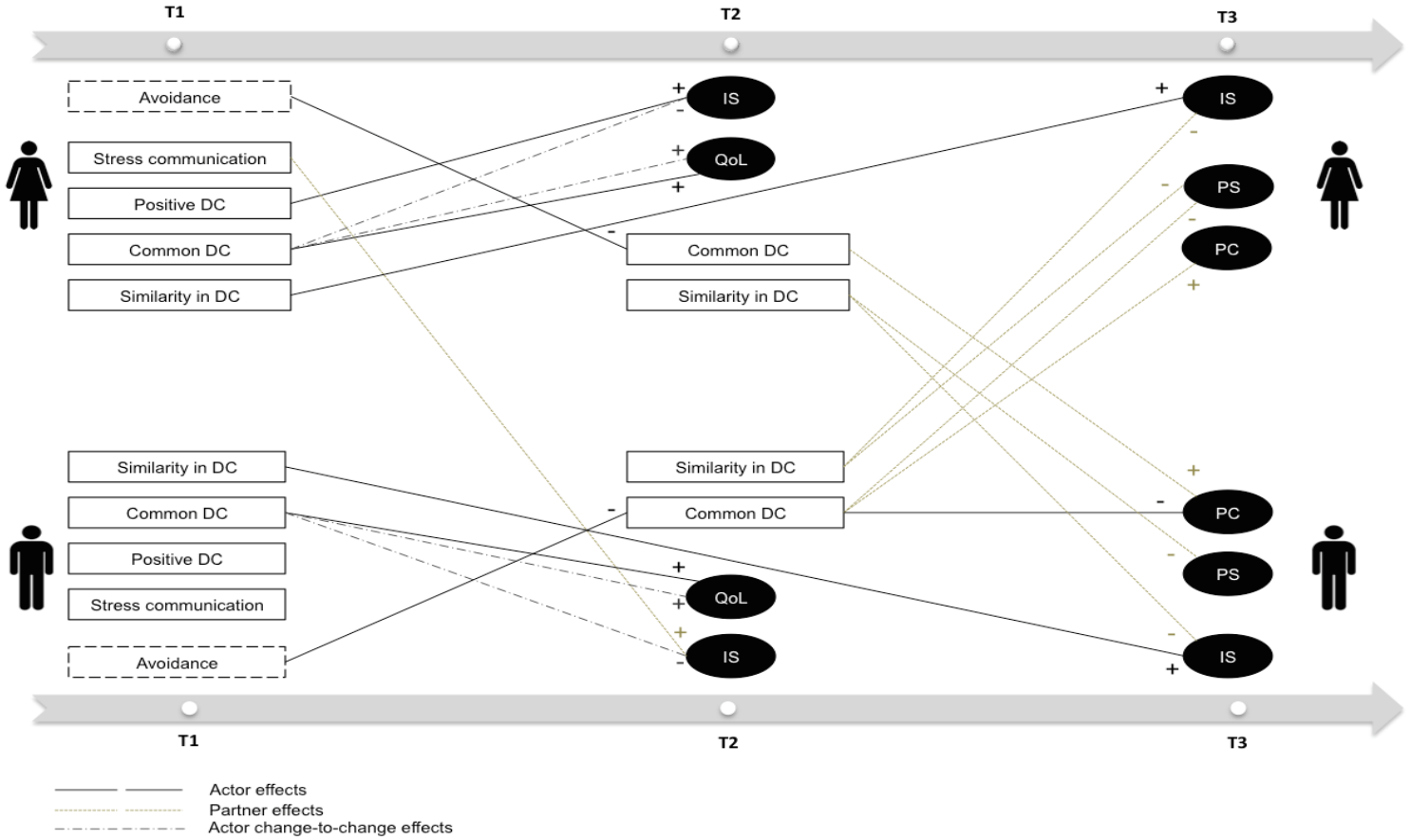

Figure 1 | Graphical representation of the longitudinal associations between DC and adjustment outcomes

Note. T1 = second trimester of pregnancy; T2 = 6 weeks postpartum; T3 = 6-9 months postpartum; DC = dyadic coping; IS = internalizing symptoms (depressive and anxiety symptoms); QoL = quality of life; PS = parenting stress; PC = parental confidence.

The **objective** of the **third phase** of this research project was to provide evidence-based guidelines for clinical practice with couples in the context of women's PPD. For that purpose, we conducted a systematic review of the literature, which comprised the studies published in the English language between 1967 and May 2015 that have tested the efficacy of interventions either to prevent or treat PPD in women that have included the woman's partner (*N* = 24 interventions). The most relevant conclusions emerging from this work can be summarized as follows:

i. The woman's partner was invited to participate either in all the sessions with the woman (mostly in preventive approaches) or only in specific sessions (mostly in treatment approaches), but **little information was provided about the partner's real attendance**: only seven studies (27%) reported that information;

ii. The **contents addressed in the partner-inclusive sessions** included mostly education about PPD and parenthood, coping strategies to facilitate the transition to parenthood such as partner emotional and instrumental supportive strategies, and problem-solving and communication skills; in the preventive interventions, these contents were primarily addressed prenatally and the group format allowed the normalization of difficulties and training of relevant skills but, overall, **little information was provided about the partner's specific participatory behaviors**;

iii. Only three studies (12%) – one preventive and two treatment studies – provided relevant data regarding the **effects of the partner's participation on women's intervention outcomes**, and only six studies (23%) have assessed **partner's mental health**;

iv. There were some **benefits associated with partner's participation**, namely a better understanding of women's emotional difficulties and experience of motherhood reported by men and opportunity to share and normalize their experiences with other men; one treatment study also observed a positive effect of the intervention on partner's general mental health.

2. General discussion of the main findings

In this section, we will discuss the four main contributions of this research project: **first**, the performance of the PDPI-R in identifying women at higher risk for PPD; **second**, the shared experience of the transition to parenthood between members of a couple; **third**, the differential impact of DC dimensions across partners and time; and **fourth**, the lack of solid conclusions regarding the role of the male partner in women's perinatal mental health care.

2.1. Which women are at risk for PPD and how do we know?

PPD is a serious clinical condition that affects the entire family, thus the importance of its early recognition and prevention is widely recognized (O'Hara & McCabe, 2013). Despite the low prevalence rates of a clinical diagnosis of PPD found in our sample, the seriousness of this condition should not be neglected (Field, 2010; Kingston et al., 2012; Muzik & Borovska, 2010). In addition, around one in five women presented clinically relevant psychological distress not only soon but also later after childbirth. Overall, the prevalence rates of PPD/ symptoms thereof were similar to those recently documented worldwide (Gaynes et al., 2005) and in Portugal (Pereira et al., 2017; Pereira et al., 2016); importantly, they highlight that a **significant percentage of women face psychological difficulties after the birth of a child in Portugal**, which, without clinical intervention, may progress into a chronic condition (Goodman, 2004b; Vliegen et al., 2014). This brought up the question of *which* women are more at risk for psychological difficulties and *how* to identify them.

The findings of Study II yielded three innovative contributions to the field of research focused on risk factors for PPD. First, our findings showed that the **predictive capacity of certain risk factors depends on the *timing of the factor assessment* during the perinatal period**. Although recent insights on this topic have been starting to emerge (e.g., Rados et al., 2016), precise information about the optimal time for PPD prediction is still lacking. Especially, our results suggest that lack of social support and life stress events increased risk for PPD when present after but not before childbirth. Moreover, as some of the associations between prenatal depressive and anxiety symptoms and PPD only occurred when considering the postnatal administration of the PDPI-R, it seems that depressive and anxiety symptoms present later in pregnancy are likely to

influence the development of further PPD, which is in line with the findings of previous longitudinal studies (e.g., Marques et al., 2017; Oppo et al., 2009).

Second, our findings also indicated that the predictive capacity of certain risk factors **depends on the *timing of the depressive symptoms assessment* during the postpartum period** (e.g., low socioeconomic status and unintended pregnancy predicted depressive symptoms only at six and nine months postpartum), an observation that was also emphasized in recent studies (e.g., Lara et al., 2016). As a result, some of our conclusions in Study I (i.e., the non-relevance of sociodemographic factors for PPD in Portuguese women) became challenged by the results of Study II, in which a low socioeconomic status appeared to be a significant predictor of high levels of depressive symptoms in the *later* postpartum period. This pattern of results illustrates the importance of conducting prospective longitudinal research in this field, considering several assessment times of depressive (and anxiety) symptoms and risk factors during the perinatal period, under consequence of misinterpretations.

Finally, the predictive capacity of certain risk factors **depends on the *type of PPD measurement*** (self-report vs. diagnostic interview). Although past research (e.g., Lara et al., 2016; O'Hara & Swain, 1996) found minor differences on this topic, our findings showed that while some risk factors were associated with postpartum depressive symptoms and a PPD diagnosis (i.e., prenatal depression and life stress events), others were only associated with one type of indicator (e.g., lack of social support). Overall, this yields additional evidence for the clinical distinction between EPDS and DSM mood-related symptoms (Matthey & Agostini, 2017), even if they are closely interrelated.

2.1.1. How to identify women that are at higher risk for psychological difficulties?

Several attempts have been made to develop screening tools for identifying women at higher risk for developing PPD, including in Portugal, with limited success (Austin & Lumley, 2003; Johnson et al., 2012; Pereira et al., 2016). One of the major contributions of this project is the **translation and validation of the European Portuguese prenatal and postnatal versions of the PDPI-R**, therefore providing researchers and clinicians of a widely used screening tool to identify women at higher risk for developing PPD in Portugal. The PDPI-R has shown to be reliable and valid across western (Ibarra-

Yruegas et al., 2018; Oppo et al., 2009; Rodríguez-Muñoz et al., 2017) and non-western (Ikeda & Kamibeppu, 2013; Youn & Jeong, 2011) countries and our findings support its applicability in the Portuguese context. Specifically, the findings from our pilot study (Study I) confirmed its **semantic equivalence** (i.e., the items were unequivocally forward and backward translated, with only minor modifications to improve clarity) and **measurement equivalence** (i.e., the preliminary evidence of the reliability and construct and convergent validities of the Portuguese version resembled the psychometric properties found in the original studies; Records et al., 2007).

In addition, similarly to previous validation studies (Ikeda & Kamibeppu, 2013; Oppo et al., 2009; Youn & Jeong, 2011), our findings provided evidence of the **validity of the PDPI-R in predicting women at higher risk** from experiencing clinically relevant postpartum depressive symptoms, similarly in the early and later postpartum period, and especially in detecting women with increased risk from developing a clinical diagnosis of PPD at three months postpartum. We highlight the better predictive performance of the postnatal version of the inventory (possibly due to the inclusion of additional risk factors and proximity of PPD assessment), presenting **moderate diagnostic accuracy** (Swets, 1988), but without nullifying the clinical relevance of its prenatal administration (due to its particular significance for predicting PPD at three months postpartum), in line with the findings of the original studies (Beck et al., 2006).

In the empirical studies, we discussed the proposed cut-off scores for the PDPI-R in light of the ones suggested in other countries, highlighting similarities and differences as well as underlying methodological and cultural reasons. However, one question that was not comprehensively addressed but is worthy of further discussion relates to the primary arguments (i.e., in terms of **accuracy indicators)** that guided the **selection of the most appropriate cut-off scores**. A screening test is considered optimal when it correctly classifies an individual as having a given disorder (sensitivity) and an individual as not having the disorder (specificity). Besides, it must be quite precise when identifying an individual as being likely to developing the disorder (positive predictive value [PPV]) and an individual being unlikely to developing the disorder (negative predictive value [NPV]) (Matthey & Agostini, 2017). The NICE guidelines (2014 updated 2018) advise the use of sensitivity and specificity in the selection of appropriate cut-off scores for screening tools, as these indicators are less dependent from the population and thus more generalizable than PPV and NPV. Moreover, the benefits and costs of the test outcomes (e.g., clinical,

financial) as well as epidemiological factors (e.g., prevalence of the targeted condition) are aspects that should be considered when establishing the cut-off scores for screening instruments (Greiner et al., 2000; van Erkel & Pattynama, 1998).

Based on this, and considering the reciprocal relationship between sensitivity and specificity (i.e., when one is higher, the other tends to be lower), we considered the most optimal balance between these two indicators in the selection of the cut-off scores of each version of the PDPI-R: we favored the threshold value with the **highest sensitivity**, therefore minimizing the probability of false negatives, which we considered more serious in this sensitive context (i.e., missing a woman with PPD has serious consequences and its prevention/treatment is advisable early in the perinatal period) but **without compromising considerably on specificity**. Indeed, attending to the low prevalence rate of PPD in our sample, false positive diagnoses would likely to occur and, therefore, lead to misappropriate conclusions such as unnecessary referrals for additional psychosocial assessment and/or support; consequently, this will result in increased time and financial costs for the health care services as well as costs for the patients (e.g., inconvenience, discomfort, and anxiety; Trevethan, 2017). Unfortunately, we should note that the resulting PPV associated with the recommended cut-off scores was generally low, varying from 20.8% to 51.8%, and the NPV was rather high, varying from 85.7% to 99.2%. This scenario is expected in the presence of low prevalent conditions such as perinatal depression (Kozinszky & Dudas, 2015), and suggests that the PDPI-R performed better in predicting women who would not experience PPD than women who would have PPD, as the likelihood of false positives is relatively high. This has important implications for clinical practice and will be discussed later in this chapter.

2.2. "We-transition to parenthood": Togetherness, reciprocity and interdependence

Expecting and having a child entails a set of psychological, relational and social lifestyle changes that require appropriate coping strategies in order to achieve a positive adjustment. Although both first and second-time transitions to parenthood involve either cross-cutting and specific reorganizations that made both types of transitions challenging (Goldberg & Michaels, 1988; Ketner et al., 2018), the findings of Study IV suggest that this transition may be harder for couples expecting their first child, at least in the early

postpartum period. While the vulnerability associated with primiparity for poorer individual adjustment has been inconsistently supported across studies (Norhayati et al., 2015; Robertson et al., 2004) – an inconsistency reflected in the remaining non-significant associations with our study outcomes – a consensual idea is the importance of the couple's relationship during the perinatal period for both primiparous and multiparous couples (Figueiredo et al., 2018; Ketner et al., 2018).

When couples obtain support and comfort from one another when coping with daily life stressors, their relationship may act as a resource that protect their wellbeing, since they become closer and more committed to one another, which ultimately foster a sense of togetherness; these aspects are crucial components of adjustment during the transition to parenthood (Bäckström et al., 2017; Pilkington, Milne, et al., 2015). The protective role of the couple's relationship (Røsand et al., 2012) was confirmed in our studies, by showing that **joint problem-solving and shared emotion regulation efforts help both partners in adjusting**, as an individual (Study IV) and as a parent (Study V), to the potentially stress-inducing situations underlying the transition to parenthood. The findings of our studies add-on preliminary research on this topic – which found positive associations between common DC and dyadic adjustment during pregnancy (Molgora, Acquati, et al., 2018; Molgora, Fenaroli, et al., 2018) – by showing how the function of common DC as a key resource for couples transitioning to parenthood expands to the period after childbirth and to the individual and parental context. Interestingly, although common DC does not target specific child-rearing issues, but rather focuses on how couples cope with stress together in general, this resource seems to influence the extent to which partners perceive more or less stress and confidence in their parental role. Therefore, our studies move beyond general research on DC, which has predominantly documented its effects on individual and marital adjustment (Falconier et al., 2015; Staff et al., 2017), and complement recent studies that showed that common DC also matters for the parental relationship (e.g., Zemp, Milek, et al., 2017). In addition, engaging in joint coping efforts during pregnancy helps couples to have better perceptions of wellbeing in multiple domains of life after childbirth, although it does not necessarily translate into lower psychological distress (Study IV). This reinforces the value of adopting a comprehensive approach to perinatal adjustment (Jomeen, 2004) and that, although related, psychological distress and QoL are not overlapping constructs (Gameiro, Carona, Silva, & Canavarro, 2010). We must note that although the couples in our sample were

generally well adjusted over time (though a meaningful proportion of couples presented high levels of prenatal depressive symptoms; Study III), adjustment difficulties may be exacerbated under stressful times, and so a better understanding of which coping resources matter for partner's adjustment is highly relevant from a prevention perspective.

Overall, it seems that a process of joint coping against stressors characterize the transition to parenthood to a larger extent than traditional forms of support (given the absence of benefits associated with supportive partner-oriented behaviors in our study). The salience of common DC has also been showed in couples managing major stressors, such as cancer (e.g., Badr et al., 2010; Rottman et al., 2015). Nevertheless, we observed that couples' engagement in common DC declined over time (Studies IV and V) – possibly due to less quality time spend as a couple after childbirth (Delicate et al., 2018; Entsieh & Hallström, 2016) – with associated decreases in QoL levels and increases in internalizing symptoms' levels (Study IV); this informs intervention strategies about the ideal time to address and foster this dyadic skill.

The findings of Study VI suggest that **members of a couple are, in general, similar in the support they provide to and receive from each other in times of stress** either during pregnancy or after childbirth. Perceived similarity in DC reflects perceptions of reciprocity or equitable exchanges of support when one partner faces stress (Iafrate, Bertoni, Donato, & Finkenauer, 2012; Iafrate, Bertoni, Margola, et al., 2012). Our results illustrated what happens when DC efforts in a couple are more or less imbalanced, complementing previous perinatal research that addressed the impact of equitable exchanges between partners (e.g., regarding division of housework, emotional support; Dew & Wilcox, 2011; Ryon & Gleason, 2018) and partially[28] supporting the assumptions of equity theory (Hatfield et al., 2008; Walster et al., 1978): **after the birth of the baby, the perceptions of more reciprocal or equitable exchanges of support within the couple positively contributed for partners' adjustment** at the individual and parental levels. We should note that more than being actually similar, it was most important for couples to perceive one another as investing in the relationship equitably, which is in line with past dyadic research (e.g., Acitelli, Douvan, & Veroff, 1993; Iafrate, Bertoni, Margola, et al., 2012). Moreover, as our analyses controlled for the

[28] A contrary effect was found during pregnancy and will be discussed in the next section of this chapter.

similarity due to shared cultural norms and values (i.e., stereotype effects; Kenny et al., 2006), this allow us to draw solid inferences about the role of the unique similarity that exists in a particular couple (due to partners' interdependence) on perinatal adjustment.

Overall, this picture seems to reflect a shift paradigm towards more egalitarian roles during the transition to parenthood, in which symmetric supportive roles (engagement in couple-oriented behaviors/common DC) and similar contributions by women and men to the relationship (perceptions of similar partner-oriented behaviors) play an important role for women and men's adjustment nowadays. The fact that we observed **more similarities than differences between women and men** defy the individual (women)-oriented approach that has been privileged in the study of interpersonal constructs during the transition to parenthood (Mickelson & Biehle, 2017). Most importantly, our results reinforce the central assumption of our research that **the transition to parenthood is a shared experience between partners** (Cowan & Cowan, 2000; McGoldrick & Carter, 2003; Perry-Jenkins & Claxton, 2011), and hence both partners can be the provider and recipient of support (Don & Mickelson, 2012; Ryon & Gleason, 2018). The current sociopolitical period characterized by changing roles and responsibilities for fathers (Cabrera et al., 2018; Eggebeen et al., 2013), including in Portugal (Matias, Andrade, & Fontaine, 2012; Ramos et al., 2016; Wall et al., 2017), may effectively be contributing to **a parenthood in transition**, with partners facing similar challenges (Crespi & Ruspini, 2015; Dribe & Stanfors, 2009). While our results seem to reflect this scenario in general, specific gender differences emerged and will be discussed later.

Dyadic interdependence

In our research, several **dyadic effects** emerged: one partner's adjustment is not only influenced by their behaviors and perceptions of DC (actor effects), but it is also influenced by their partner's behaviors and perceptions of DC (partner effects). Interestingly, actor effects of common DC were found regarding individual adjustment (but none partner effects; Study IV), while partner effects of common DC were found for parental adjustment (but none actor effects – one exception will be discussed in the next section; Study V). Moreover, perceptions of DC similarity *during pregnancy* influence the individual but not their partners, while perceptions of similarity in DC *after childbirth*

influence the partner but not the individual (Study VI). We found, in many circumstances, **stronger partner effects than actor effects, especially after childbirth**. As an individual and as a parent, partners benefit in the long term from having a partner that engage in joint coping efforts (Study V) and perceive similar efforts in the couple to help the other coping with stress (Study VI) soon after childbirth. Even in studies in which couple-level factors (actual similarity in DC, computed between partners) were found to have any impact on partners' adjustment (Study VI), the stronger impact of subjective perceptions (perceived similarity in DC, computed within-partner) emerged across partners rather than within-partner.

These findings brought up the question of **what can explain this interdependence**, especially salient after the birth of the baby. The period soon after childbirth is likely to reinforce partner's dependence in one another, as **the birth of a baby affects both partners at the same time and as a unit** (conceptualized as direct dyadic stress in STM terms). Even if women and men may experience some unique challenges (e.g., unlike men, women face several physical changes), these can cross over to the other partner and affect both (Westman, 2011). This rationale is sustained by the widely documented emotional interdependence between partners after childbirth (Anding et al., 2016; Don & Mickelson, 2012; Wee et al., 2011). Engaging in joint coping efforts and perceiving that both partners contribute equally to the relationship may act as a foundation for togetherness ("we-ness"), mutual understanding, commitment and intimacy (Bodenmann, 2005; Bodenmann et al., 2016; Cutrona, 1996; Lemay & Clark, 2008; Murray, Holmes, Bellavia, Griffin, & Dolderman, 2002). Accordingly, both partners can benefit from this positive shared context, regardless of which partner perceives it, as these constructs involve direct implications for the relationship and the couple as a whole. Our findings may then translate that not recognizing the engagement or similarity in DC could be particularly beneficial, which is in line with the invisible support hypothesis: the provision of support might have more positive effects on the recipient's adjustment when it is invisible for the recipient (i.e., one partner's provided support but the other did not perceive or is not aware of it) (Bolger, Zuckerman, & Kessler, 2000). These possible explanations should be investigated in further research. On the other hand, given the unexpected partner effects above actor effects in light of general dyadic research (Kenny et al., 2006), the strong interdependence observed in our study may reflect **Portuguese cultural specificities**. Indeed, Portugal can be classified as a country with a collectivistic-

oriented culture, with a central *familialism* and *maternalism* focus (Vedes et al., 2016). Findings from national studies highlight that the partner is the most important person in the Portuguese lives and their main source of support (Aboim, 2006; Aboim, Vasconcelos, & Wall, 2013). In line with this, cross-cultural research showed that, compared with couples from other cultural backgrounds, Portuguese couples rely predominantly on their partners for support and the interdependence between partners is particularly high in the Portuguese context (Schoebi, Wang, Ababkov, & Perrez, 2010). The collectivistic nature of the Portuguese culture may also explain the salient role of common DC in our research (Vedes et al., 2016). The replication of our study in other countries and cultures will provide important clues to understand the cultural influences in this context.

Factors affecting dyadic coping

The STM anticipates several individual and stressor-related factors affecting the DC process (Bodenmann et al., 2017; Bodenmann et al., 2016) and a recent review (Staff et al., 2017) has summarized the empirical evidence on this topic, highlighting a range of individual and contextual **antecedents of couple's engagement in DC** (e.g., gender, relationship satisfaction, roles within the relationship such as patient vs. caregiver, cultural orientation). The findings of Studies III and V contributed to expand this knowledge, by demonstrating that the **presence of psychological distress** in women can undermine couple's engagement in DC (DC by oneself and common DC) as well as affect their perception of their partner's engagement in DC (DC by the partner) during pregnancy (Study III) and that individuals with more **avoidant attachment representations towards their partners** during pregnancy were less likely to engage in common DC after childbirth (Study V).

Our findings underline that when pregnant women are psychologically distressed, this has negative repercussions on the dyadic adjustment of couples – adding-on the scarcity of studies that have addressed the interpersonal impact of depression during pregnancy (Figueiredo et al., 2010) – but also on the ways they cope together with stress. Although any impact seems to be evident on the way these couples express their stress and request support (stress communication process), they seem to lack the resources to support each other when dealing with daily life stressors, even more in situations of couple's comorbidity, which is common during pregnancy (Field et al., 2006). These

findings are in line with previous research documenting the negative interplay between depression and impaired couple's problem-solving skills in the general population (e.g., Coyne, Thompson, & Palmer, 2002; Davila, Stroud, & Starr, 2009) and complement the wide research focused on the interpersonal context of depression after childbirth (Westall & Liamputtong, 2011). However, since our results in Study III were based on cross-sectional data, they should be interpreted cautiously.

Replicating previous research (Batinic & Kamenov, 2017; Levesque et al., 2017), our results show that avoidant romantic attachment had large pervasive implications for common DC, as the inherent cohesion and togetherness of joint coping efforts are incompatible with the core beliefs of more avoidant individuals, who strive for independence and autonomy in their couple's relationship (Mikulincer & Shaver, 2016). In turn, if diminished, common DC can deprive couples of an important resource for feeling more confident and less stressed in the parental role, as discussed above. Accordingly, our findings suggest that common DC represents an important mediator in the well-established avoidance-parental adjustment link during the transition to parenthood (Kohlhoff & Barnett, 2013; Rholes, Simpson, & Friedman, 2006); they complement past work focused on potential dyadic mechanisms that can account for this association (e.g., Kazmierczak, 2015; Schoppe-Sullivan et al., 2016) by informing about a concrete modifiable target in the couple's relationship (Bodenmann & Shantinath, 2004). Ultimately, our findings add evidence to the Attachment Diathesis-Stress Process Model (Simpson & Rholes, 2018) and the framework proposed by Pietromonaco et al. (2013), which recognize, in a similar integrative way, the pathways between romantic attachment, dyadic processes and partners' adjustment.

2.3. Sometimes beneficial, sometimes prejudicial: The differential impact of DC across the transition to parenthood

Support-related processes within close relationships encompass multiple aspects such as support-seeking (which includes verbal and non-verbal self-disclosure), support-giving, and perceptions of support received (Collins & Ford, 2010). While the later was widely examined in perinatal research (what is broadly known as "perceived partner support") (Pilkington, Milne, et al., 2015), the impact that the remaining processes may have on the adjustment of couples transitioning to parenthood remains rather overlooked.

The findings of Study IV yielded further insights on this topic, by addressing the effects of stress communication and positive and negative partner-oriented behaviors on partners' adjustment: they showed that **members of the couple benefit differently from stress communication** (being somewhat prejudicial for men when enacted by women) **and positive DC** (being somewhat prejudicial for women when enacted by them) in terms of psychological symptoms. Another interesting pattern of results that varied across women and men was found for common DC in Study V: men's feelings of confidence in their parental role are enhanced when their partners (women) perceive higher engagement in common DC, but are reduced when they (men) perceive higher engagement in common DC. Moreover, common DC was only found to be predictive of women's but not men's parenting stress.

Taken together, these findings suggest a **hypothesis for the differential impact of these forms of DC that involves cultural beliefs surrounding fatherhood and motherhood**. In the majority of westernized countries, including Portugal, individuals are oscillating between egalitarian and traditional gender roles and attitudes surrounding family life (Matias et al., 2012; Ramos et al., 2016). Although there is a high proportion of full-time dual-earner parents and increasing changes towards father's participation in childcare and family life (including reformulation of family policies regarding parental leave), women still assume the role of primary caregivers and are responsible for the majority of household and childcare tasks (Cabrera et al., 2018; Matias et al., 2012; Ramos et al., 2016; Wall et al., 2017; Yavorsky, Dush, & Schoppe-Sullivan, 2015). Especially during the transition to parenthood, the mother-baby-oriented context of care may elicit members of the couple to assume more traditional roles (Katz-Wise et al., 2010; Perales et al., 2018; Taylor et al., 2018): the woman as the member that seek and obtain support (support-recipient) and the man as the member who protect her spouse and respond to her needs (support-provider) (Darwin et al., 2017; Levy-Shiff, 1999; Mander, 2004).

In line with this characterization, we observed that **women** communicated, effectively, more stress than men (Study III) and that the provision of support by women may have negative consequences for their own wellbeing in the long term (Study IV), perhaps because it is resource and time consuming at a time in which they face several changes compared to men (e.g., in the physical domain), or they feel inequitable exchanges of support (i.e., women providing support without receiving it). On the other hand, women seem to benefit when both members of a couple engage together in a shared

process of coping, both during pregnancy (Study IV) and at six weeks postpartum (Study V), perhaps because joint handling of everyday stressors helps to relieve women's greater family and household responsibilities.

Regarding **men**, they do not seem to be always comfortable in engaging in joint efforts to cope with stress (Study V) as well as in communicating their stress to their partners (Studies III and IV) and in dealing with their partners' stress communication (Study IV). This pattern of results is in agreement with their stronger motivation to avoid closeness and dependence (i.e., higher avoidant attachment representations) compared to women (Study V). A beneficial effect of common DC was found in their QoL at six weeks postpartum (similarly to women; Study IV), but a detrimental effect was found in their parental confidence and no significant effect was found in their parenting stress at six-nine months postpartum (Study V). In line with the societal constraints and ongoing traditional beliefs surrounding masculinity (Mander, 2004; Taylor et al., 2018), they may see the engagement in common DC after childbirth as a sign of failure in protecting their partners or as a sign of personal incompetence, leading to feelings of poor confidence in undertaking parenting chores. This line of thinking is supported by the fact that men use individual coping more often than women (Staff et al., 2017).

However, they may feel some relief in many other aspects of life early after childbirth when engaging in common DC. Likewise, we observed that men feel more confident in their parental role when their partners (women) are willing to engage in collaborative strategies when coping with daily life stressors, perhaps because men become more involved in the family's everyday concerns, as if they were "part of a team" (Afifi et al., 2018), and hence better equipped to manage potential insecurities related to the paternal role (Kowlessar et al., 2015a). As women generally perceive more confidence in the parental role than fathers (Study V) – due to their greater involvement in child care (Biehle & Mickelson, 2011; Hudson, Elek, & Fleck, 2001) – the promotion of common DC in couples, where appropriate, can then be particularly useful for men. This challenging result may be explained by the previous argument that receiving support might be especially beneficial when the recipient of support did not perceive the other's efforts of support, as in this way the recipient's self-efficacy and sense of competence cannot be threatened (Bolger et al., 2000). A similar line of thought may also be reflected in the results of Study VI: the pattern of results found for men suggest that **togetherness and reciprocity in the couple are beneficial for men's adjustment as long as they**

are unaware of their existence. These findings are in line with the partners' apparent ambivalence about being more involved and supported in perinatal mental health care services (Darwin et al., 2017; Taylor et al., 2018): although they want to be more involved (egalitarian attitude), they do not want to take attention away from their partner's needs, which should be prioritized (traditional attitude). These possible explanations should be investigated in further research.

Finally, the findings of Study VI demonstrated that partners experience positive consequences of perceptions of similar/equitable DC exchanges *after childbirth* (as discussed above), but negative consequences when a comparable picture is present *during pregnancy* (i.e., a situation of inequity/more complementarity seems to be more beneficial during pregnancy). These findings indicate that the **specificities of the perinatal period under consideration may produce differential outcomes for similarity in DC**. Pregnancy is a predominant women-centered phase, during which women experience more physical changes and are particularly vulnerable to emotional fluctuations (Hodgkinson, Smith, & Wittkowski, 2014; Staneva, Bogossian, & Wittkowski, 2015) compared to men. Accordingly, perceiving complementary (as opposed to similar) exchanges in DC during pregnancy is likely to better fit each partner's needs of support and hence have more positive effects in the long term. We hypothesize that the benefits underlying this complementarity involve situations in which men engaged more in DC behaviors than women to respond to the partner's stress. This hypothesis is in line with the socially expected attitudes for women (support-recipient) and men (support-provider), as well as the support needs identified by male partners during the prenatal period (e.g., to acquire resources to support their spouses; Rominov et al., 2018), and should be tested in future studies. In contrast, as noted in the previous section of this discussion, the period after childbirth entails stressors that increasingly concern both partners (e.g., renegotiation of new responsibilities, household routines and social commitments, managing changes in the couple's relationship; Cowan & Cowan, 2000; St John et al., 2005; Rominov et al., 2018). Accordingly, the perceptions of reciprocal exchanges of support could be especially important at this time. Similar reasons may explain why common DC at pregnancy was not found to be a significant predictor of internalizing symptoms, but the reduction observed in joint coping efforts over time was associated with increases in levels of psychological distress (Study IV) – as the pregnancy progresses to the time after childbirth, both partners are likely to be stressed and the

reduction of symmetrical supportive roles (e.g., spending time together and openly discussing one another's concerns; Deave, Johnson, & Ingram, 2008) can make it difficult to adjust to the birth of a child. Taken all the findings in research phase II together, they seem to reflect the ambivalent attitudes that Portuguese couples hold surrounding family life nowadays: members of a couple seem to benefit from a shared process of coping and equitable exchanges in their relationship, while at the same time endorsing specific needs and roles of support for women and men. Figure 2 presents a simplified integration of the findings in research phase II.

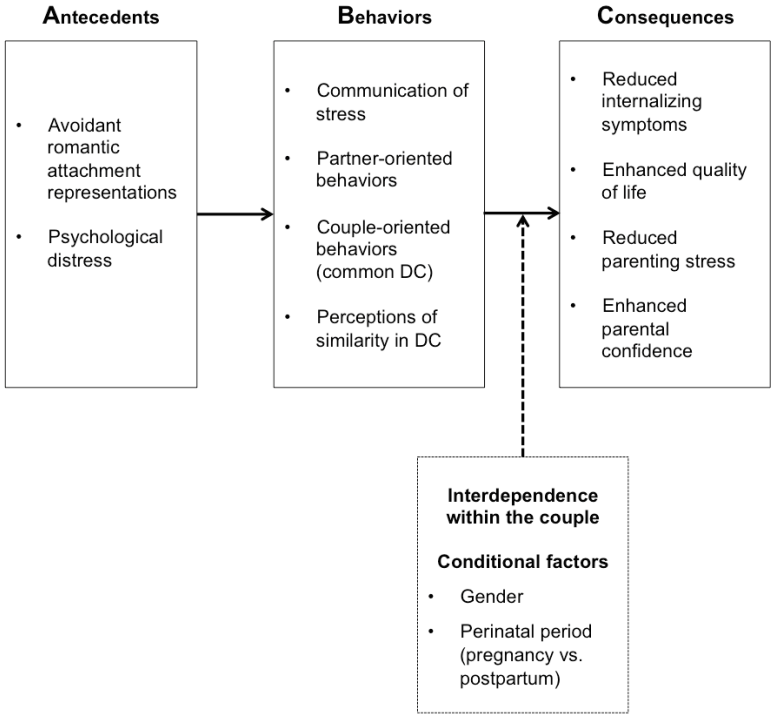

Figure 2 | Comprehensive integration of findings in research phase II

2.4. Examining the efficacy of partner-inclusive interventions for PPD without partner-related information: Missing links between theory, research and clinical practice?

There is a growing recognition that the male partner plays an important role in supporting women facing perinatal psychological distress (e.g., Fonseca & Canavarro, 2017; Holopainen, 2002), and that the inclusion of the male partner in women's perinatal mental health care could be beneficial for both the woman and the partner himself (Cohen &

Schiller, 2017; Taylor et al., 2018). Nonetheless, there are no evidence-based guidelines to orient clinicians' work with couples either to prevent or treat PPD among women and those are indispensable before perinatal services adopt any novel strategies. To fill this gap, we systematically reviewed the studies that have tested the efficacy of psychosocial and psychological interventions in preventing or treating PPD among women that have included the male partner. By summarizing the findings of this body of research, our systematic review showed that, effectively, **a large number of interventions included the male partner** but **few studies have elaborated on their role** in the intervention procedures.

Important questions remain to be answered and **limit the drawing of robust conclusions** on whether the women's response to the intervention reflect their partners' participation, the contents addressed, or the combination of both – that is, **the active ingredient of the intervention that led to the observed improvements of depressive symptoms**. Consequently, while consistent evidence suggests that being included had several benefits for the male partner (e.g., to increase awareness about women's perinatal mental health difficulties and to express their own coping difficulties; Brandon et al., 2012; Morgan, Matthey, Barnett, & Richardson, 1997; Thomas, Komiti, & Judd, 2014), the **current knowledge is not sufficient to be translated into guidelines** that inform how the male partner can be involved to improve women's perinatal mental health care. As a result, further research on this topic is needed and a brief discussion about the potential reasons underlying this lack of partner-related information is required to move this field forward. In line with the main conceptual and methodological limitations of the wider perinatal dyadic research (which have motivated our empirical studies in research phase II), the fact that the reviewed studies have considered the partner's involvement yet without truly adopting a dyadic perspective may not be so surprising and could reflect similar gaps. We hypothesize that the **non-consideration of couple-focused frameworks** and the **lack of empirical evidence** that encourage viewing the couple as the unit of intervention constitute major explanations for the lack of relevant information about partners.

Specifically, **most of the interventions targeted relationship constructs** (e.g., partner supportive strategies, communication skills) **without grounding on couple-focused theoretical models** that guide solid prevention and psychotherapeutic approaches with couples, as they proved to be effective for depression in the general

population (Barbato & D'Avanzo, 2008). The unique exception was the study of Brandon et al. (2012), which tested the efficacy of a couple-based intervention (Partner-Assisted Interpersonal Psychotherapy) grounded on specific elements from Emotionally Focused Couple Therapy. Although this study entailed important limitations (e.g., absence of a comparison group), it offered initial insights about how to make use of the partner as an "assistant" to help women recovering from perinatal depression. This rationale is supported by the findings of Pilkington, Whelan, and Milne's (2015) systematic review, which showed that perinatal interventions containing a "partner or relationship component" did not always include the woman's partner; therefore, it is reasonable to assume that the adoption of comprehensive couple-based models, such as the STM, is more likely to stimulate researchers to do so and, arguably, to explore the effects of his involvement.

On the other hand, since couple intervention strategies are developed and refined based upon basic research (Bodenmann, 2010; Bodenmann & Randall, 2012) and few studies conducted during the transition to parenthood have adopted a dyadic approach, researchers may not be aware of the potential influence of the male partner's participation on the woman's individual adjustment outcomes (i.e., dyadic effects) or that both women and their partners could benefit, as individuals, from the same couple-related contents (e.g., training of DC skills); as a result, these aspects were not assessed. Taken together, these reasons may also explain why most of the reviewed studies have included the male partner without providing clear theoretical or evidence-based arguments for doing so.

Although effective in their primary goals (i.e., to prevent or treat PPD in women), since many interventions for PPD already include the woman's partner (as illustrated in our systematic review) and its inclusion, where appropriate, offers an opportunity to use him and the relationship as a valuable resource (Cohen & Schiller, 2017), partner-inclusive interventions for PPD may be enhanced by integrating couple-based intervention principles with empirical knowledge from perinatal dyadic research; ultimately, the role of the male partner in this context and potential benefits of his involvement may be clarified. On this regard, we will provide, later in this chapter, some insights regarding the development of further preventive and treatment interventions for PPD based on our empirical findings (research phase II).

3. Strengths and limitations of the research project

3.1. Strengths

This research project presents several theoretical and methodological strengths that contribute to enhance our understanding of the adjustment of women and their partners during the perinatal period. At the conceptual level, the findings of the PDPI-R validation studies (research phase I) provided significant reflections about the **clinical relevance, optimal time and potential way of conducting a psychosocial assessment** in the Portuguese maternity care settings, thereby encouraging changes for mental health care of pregnant and postpartum women.

The empirical studies conducted with couples (research phase II) innovatively contributed to the literature on coping and partner support during the transition to parenthood by **empirically testing the STM in the perinatal context** and, consequently, sustained our progression from the absence of relationship-based frameworks to the study of theoretically driven dyadic processes. In fact, the consideration of solid theoretical frameworks – namely the STM (Bodenmann, 1995, 2005), the Attachment Diathesis-Stress Process Model (Simpson & Rholes, 2017, 2018), and Pietromonaco et al.'s (2013) framework – to elaborate our research questions, objectives and hypotheses as well as to interpret our empirical results represents one of most important contributions of the this research project to perinatal dyadic research. It was one of the first studies exploring the role of distinct forms of DC in the short and long term during the perinatal period: the cross-sectional study (Study III) provided an overall picture of couples' DC strategies when women experience high levels of depressive symptoms during pregnancy (thus moving beyond the predominant focus on the interpersonal context of depression after childbirth), while the three longitudinal studies (Studies IV to VI) offered significant contributions of how and when certain forms of DC impact partners' adjustment.

Moreover, we privileged a **comprehensive and multidimensional approach to partners' adjustment**, examining multiple indicators (individual, dyadic and parental) either positive (e.g., QoL) or negative (e.g., parenting stress), therefore expanding the predominant research focus on the role of the couple's relationship on psychopathological symptoms. Most importantly, we found common but also different predictors for positive and negative dimensions of functioning, which support the relevance of this holistic

approach. Finally, the systematic review (research phase III) allowed us to synthetize the current evidence related to **the participation of the male partners in interventions to prevent or treat PPD in women** and, importantly, raised valuable orientations for future research interested in developing and testing the efficacy of partner-inclusive interventions in this field.

Three main **methodological strengths** of our research project should be underlined. First, the adoption of a **prospective longitudinal design** (research phases I and II), which started during a phase of expectation as participants anticipate their baby's birth (second trimester of pregnancy), moving to an acute phase of changes and reorganizations in participants' lives after the birth of the baby (six weeks postpartum), and ending in a phase in which participants have had time to adjust to their new responsibilities and routines (between six and nine months postpartum). This design allowed not only to characterize both women and their partners' adjustment throughout time but also to capture the directionality of the relations between the study variables (controlling for previous assessments of the variables), particularly relevant for the enhancement of knowledge about potential targets to be considered in preventive approaches. Specifically, this design allowed us to apprehend the differential effects of certain variables on subsequent adjustment depending on the time they were assessed (prenatal vs. postpartum), yielding interesting findings in both research phase I (regarding certain risk factors for PPD) and research phase II (regarding perceived similarity in DC).

Second, the assessment of women with a **psychiatric interview** at four months postpartum to determine the presence/absence of PPD (research phase I), which is a more robust way to estimate PPD prevalence rates (compared to self-report questionnaires) and is the most recommended gold standard for testing the accuracy of screening questionnaires such as the PDPI-R.

Third, the **data collection from both partners** and specifically the consideration of the **couple as the unit of analysis**, grounded in the assumption that members of a couple are non-independent (Kenny et al., 2006). The use of **sophisticated statistical techniques** specifically designed for handling dyadic data (namely the APIM; Cook & Kenny, 2005), enabled us to capture within couple similarities and differences underlying the process of adjustment as well as the couple experience of expecting/having a child (i.e., the mutual influences between partners over time while controlling for actor

effects), which would not have been possible otherwise. In particular, we used SEM techniques to model our dyadic data, an approach that has been widely used in dyadic research given its flexibility for testing complex research questions, possibility to model latent constructs, examine direct and indirect effects within the APIM, and handle a significant amounts of missing data with advanced solutions such as FIML (Ledermann & Kenny, 2017). Moreover, by assessing DC through a dyadic perspective (i.e., each partner completed the scales measuring DC by oneself and DC by partner) allowed us to take even more advantage of couples' data (Nussbeck & Jackson, 2016) and to examine within and between partners similarity in DC responses. As a final remark, we should note that a **high proportion of men** participated in our research – of the 335 protocol received at T1, only 25 (7%) were completed exclusively by the woman – which represents an important strength of our study considering the general lower participation of fathers in family research (Costigan & Cox, 2001).

3.2. Limitations

Despite these strengths, our results should be interpreted in light of several limitations. A first set of limitations pertained to both **phases I and II** of this research project and can be summarized as follows:

High drop-out rate over time: despite our efforts to maximize participants' retention (i.e., text messages were timely sent to remember the completion and delivery of the set of questionnaires), a high proportion of participants dropped-out from the study at each wave. This scenario is not uncommon in perinatal Portuguese research (e.g., Bos et al., 2013; Marques et al., 2017; Pereira et al., 2017) and several reasons could account for this attrition. We presume that the lack of financial compensation is one of the main reasons to withdrawal, which may be particularly relevant when participants lack intrinsic motivation to invest the time needed to participate in the study; this factor could even explain the 40% of participants that consent to participate but did not deliver the assessment protocol at T1, though other factors may also play a role (e.g., limited opportunities to deliver the protocol after being recruited, long delay between the obstetric appointments). Moreover, although women's sole participation was welcomed (for the purposes in research phase I), the predominant dyadic nature of the longitudinal study, which highly reinforces the participation of both partners, may have demotivated

one's to continue if the other was no longer willing to participate. Finally, the follow-up assessments conducted by post may have introduced practical barriers for continuation in the study (i.e., as participants needed to leave the protocols in a mailbox, this may have been time-consuming).

This resulted in a reduced sample size at follow-up assessments and consequent power to detect small effects (e.g., theoretically meaningful associations were found to be non- or marginally significant) and perform additional analyses, namely to control for potential confounders or test moderation hypotheses. This question was particularly relevant for the studies in research phase II; although our sample has a reasonable size in couple research and we constrained several paths across gender so the models have fewer parameters, the examination of more complex models with SEM techniques would require a larger number of observations (dyads, in our case) to attain the desirable power to detect small effects (Kline, 2005). Moreover, it seems that a specific subgroup of participants (those who reported lower education, unplanned pregnancy, obstetric complications, lower DC and dyadic adjustment during pregnancy) dropped out more easily from the study; therefore, the applicability of our results is restricted to the specificities of our sample of relatively high educated and well-adjusted participants.

One time point assessment during pregnancy: although numerous arguments supported our choice to consider the second trimester of pregnancy as our unique prenatal assessment (see Chapter II), we recognize that the first and third trimesters include some specificities (i.e., pregnancy acceptance and proximity of delivery time, respectively) which would have offered additional contributions regarding (a) the ideal time to conduct certain assessments (e.g., with the PDPI-R and DCI) before childbirth as well as (b) the possibility to assess antenatal adjustment outcomes.

Heterogeneity of the sample regarding parity: in both phases of the project, we used a broad definition of the transition to parenthood, including both primiparous couples/ first-time parents (representing ~65% of the sample) and multiparous couples/ experienced parents (representing ~35%). Although the unique consideration of primiparous participants would have resulted in a more pure sample, we welcomed this heterogeneous sample in order to embrace a diversity of experiences, therefore allowing to establish patterns, regardless of its heterogeneity. However, we acknowledge that the experience of becoming parents for the second/third time is probably different from first-

time transition to parenthood in some aspects (e.g., caring for more than one child) and, thus, may be reflected into a distinct risk profile for PPD or DC requests and processes. Despite this limitation, overall, parity did not significantly influence participants' adjustment in our study (as shown in the preliminary analyses conducted in the empirical studies; see Chapter III), and then we refrained to include this variable in the analyses so as not to add more complexity to already complicated models[29].

Recruitment at a single site: although the recruitment process took place in a public referral maternity hospital, most women followed in this setting were from the central region of Portugal; thus, our results may not be representative of the experiences of women/couples who live in other areas of Portugal, as well as wealthier women/couples attending private healthcare services.

Absence of potentially relevant contextual information: finally, we should recognize that, in accordance with the social-ecological framework (Bronfenbrenner, 1977), the couple system is interconnected with other ecological systems (e.g., workplace environment, family policies), which can affect how couples experience the birth of a child. Among the important employment-related factors that may affect this experience, we assume that (a) the family's income, (b) the use, length and type (e.g., shared) of parental leave parents may have took, and (c) the time they returned to work after this period may play an important role. Therefore, it would be advantageous to explore this in further research.

The following issues pertained specifically to the **phase II** of this project:

Only use of self-report questionnaires and absence of stress-related variables: we selected well-validated self-report measures to assess the constructs of interest and obtained, in general, good values of internal consistency. However, we acknowledge the possible lack of accuracy of this type of measures, even though they were specifically designed to capture complex processes (e.g., the DCI). In addition, although all the participants were experiencing a similar stressor event, the extent to which participants experienced high or low levels of general stress at each phase of this transition

[29] Study IV constituted an exception as parity was significantly associated with individual adjustment at 6 weeks postpartum and, thus, was controlled for in the analyses.

was not assessed. Given the centrality of stress to the construct of DC, this would be valuable to consider in future research.

Possible sharing of information between members of a couple: we cannot exclude the possibility that members of a couple were aware of one another's responses to the questionnaires, even though clear instructions were made (verbally and in the consent form) to complete the questionnaires independently from one another. In such cases, participants' responses could be biased and, thus, our findings should be interpreted cautiously.

Limited assessment of interpersonal variables over time: romantic attachment was only assessed at baseline and DC was assessed at the two first assessment time points, despite their likelihood for change across time. For instance, Studies IV and V showed that common DC declined from pregnancy to six weeks postpartum, but we were unable to examine the continuation of this trajectory until six and nine months postpartum. Moreover, although recent studies showed that attachment representations are likely to be stable through the first two years after childbirth (Stern et al., 2018), other documented changes in romantic attachment over the perinatal period as a result of significant experiences (e.g., Simpson, Rholes, Campbell, & Wilson, 2003), and its assessment at multiple time points has been recommended (Pietromonaco & Beck, 2015). To increase the feasibility of our research we had to make decisions about which variables to be assessed at the different time points to avoid long assessment protocols and consequent attrition; as a result, we opted to assess partners' adjustment at all time points (T1, T2 and T3) and examine interpersonal variables at the first two moments (T1 and T2) as we were interested in drawing implications for the prevention of short and long term adjustment difficulties through the promotion of relevant interpersonal targets early in this transition.

Absence of assessment before pregnancy: finally, since the first assessment occurred during the second trimester of pregnancy, we were not able to characterize previous levels of adjustment and interpersonal variables (e.g., whether the level of DC of couples reflect what already existed before pregnancy). However, given the time- and resource-consuming nature of such approach, the longitudinal design employed in this project is a classical prospective study of the transition to parenthood, and enabled us to test several predictive hypotheses. For obvious reasons, the recruitment of couples prior

to pregnancy will require considerable resources and certainly difficult to achieve within the context of a PhD. Nevertheless, this limitation did not nullify the results we obtained, which constitute an important first step to understand the associations between DC and adjustment outcomes within a group of couples becoming parents for the first or second time.

4. Implications for future research

Based on the strengths and limitations of the empirical studies in research phases I and II as well as the interpretation of our empirical results, several avenues for further research should be acknowledged.

4.1. Embracing the strengths and overcoming the limitations of our research

The main findings in research phase I highlight the need of more **prospective longitudinal studies,** covering both pregnancy and the postpartum period, if researchers aim to examine risk factors for PPD and that the **PDPI-R is a reliable and valid instrument** for that purpose, namely to predict which women are more likely to develop PPD or symptoms thereof in the short and long term. Specifically, given its shortness, it may be indicated for studies with multiple assessment time points and large cross-cultural research. On a related note, our findings encourage the continuation of the validation of the PDPI-R to other languages and countries, rather than developing new inventories of risk factors, as the PDPI-R seems to fit a wide range of cultural realities and thus will enable cross-cultural comparisons.

The findings from the empirical studies in phase II also underscore the need of future studies to continue covering the **complexity of the adjustment process** of women and their partners to the birth of a child underlined in our study, as well as informing about the study design (prospective longitudinal, encompassing the time before and after childbirth), the participants (**both members of a couple**), the adjustment outcomes (**multidimensional** indicators, including positive and negative dimensions of functioning), the dyadic processes (especially, **common DC**) and the analytical methods (e.g., **APIM**) that should be further considered. Particularly, given the prominent partner

effects that we found in our study, a better understanding of the influence of the couple's relationship requires, definitively, a dyadic approach at both the conceptual and statistical levels. In addition, as our findings added empirical evidence to the theoretical frameworks adopted in this research, they advocate their further use in perinatal research, in order to estimate the extent to which these theoretical principles can be converted into evidence-based guidelines to be implemented in perinatal mental health services (e.g., STM-derived interventions).

Researchers should also made efforts to overcome the aforesaid limitations of our research. First, it would be important to offer **incentives for participation** and/or consider the use of **online forms** (at least to conduct the follow-up assessments). Specially, to overcome common concerns in dyadic studies, efforts should be made at the recruitment and data collection phases (e.g., **reinforcing confidentiality issues** and normalizing marital conflicts and challenges to promote participation of couples less adjusted maritally; conducting **separate data collection** interviews or ordering the questionnaires differently for women and men; Wittenborn et al., 2013). Moreover, future studies should elaborate on **strategies for engaging and retaining individuals with low educational levels** (e.g., selection of self-reported questionnaires with a lower cognitive burden). Particularly, in further studies in the field of PPD, efforts should be done towards a higher engagement of women with certain characteristics (i.e., those with less education, unplanned pregnancy, pregnancy complications or experiencing psychological problems during pregnancy), as they represent a subgroup of women at high-risk for PPD that is likely to be missing in the analyses (and thus reduce the predictive capacity of certain risk factors).

Collecting data at **multiple settings** (including public and private healthcare services) across the country also need to be considered; the achievement of larger and more diversified samples would enhance the sub-sample of women with a diagnosis of PPD – which is particularly relevant for further studies conducted in the field of PPD prediction – as well as facilitate the assessment of **potential moderators** of the associations between DC and adjustment indicators (e.g., does DC predict adjustment differently among **primiparous and multiparous parents**?). However, we should note that these recommendations entail more research resources, which are in many cases not available.

Regarding assessment, replicating this study using **observational measurements of DC and/or interviews with couples** will shed some light on whether these associations hold similarly or differently when using different ways to assess this complex construct, and yield a more in-depth picture of the dynamic process of DC (Nussbeck & Jackson, 2016). This will also help to more accurately assess *actual similarity in DC* by comparing enacted behaviors between partners (rather than perceptions about behaviors, as examined in our study). Future research should also consider assessing adult attachment styles by mean of an interview (e.g., Attachment Style Interview; Bifulco et al., 2004) rather than self-report measures. In addition, researchers should examine DC dynamics and romantic attachment across multiple time points after childbirth. Finally, future studies should include additional **measures of stress**, including biomarkers of stress, as well as information about **income**, **parental leave**, including whether parents **returned to work** after this period and when.

4.2. Addressing open research questions

Although this research project has brought many insights regarding the prediction of PPD and the role of DC during the perinatal period, the interpretation of our empirical findings originated several research questions to be further addressed. We highlight the need:

i. To examine the **predictive validity of the PDPI-R** in other time points during pregnancy **(i.e., first and third trimester),** as our results suggest that well-known prenatal vulnerabilities (e.g., lack of social support, life stress events, prenatal anxiety) were not detected in the second trimester of pregnancy (Study II);
ii. To explore the **gender-roles attitudes** endorsed by each partner during the transition to parenthood and how they may contribute to the differential impact of dimensions of DC for women and men (Studies IV and V);
iii. To explore the extent to which **dyadic attachment styles** (i.e., the interaction of both partners' attachment representations) will complement our findings by considering romantic attachment at the dyadic level, as we did not find dyadic effects between attachment-related dimensions and common DC

in the way they were operationalized in our study, though they were expected (Study V);

iv. To examine the dyadic mechanisms through which **perceived similarity in DC influence partners' adjustment** and disentangle the influence of **complementary partner-oriented DC behaviors** (i.e., would the direction of this complementary in DC lead to differential outcomes, considering which partner provides more or less support to the other?), as it appears that perceived similarity or equity is not always the key in understanding how support exchanges were associated with adjustment outcomes (Study VI);

v. To clarify the **underlying mechanisms** of the prominent **interdependence** within couples (i.e., partner effects) and to explore if the paths through which one partner's perceptions of DC shape the other's adjustment are the same for women and men (Studies IV to VI);

vi. To examine whether our empirical results reflect **cultural characteristics** (e.g., collectivistic-oriented cultures such as the Portuguese one show higher interdependence and common DC; Vedes et al., 2016) or **transition to parenthood specificities** – this could be achieved by performing within-country comparisons (e.g., including a comparison group of Portuguese couples not transitioning to parenthood) and between-countries comparisons (e.g., comparing findings in cultures with collectivistic vs. individualistic orientations; Falconier et al., 2016).

vii. To examine the **efficacy of interventions aimed at promote DC strategies** (e.g., the CCET[30]; Bodenmann & Shantinath, 2004) during the

[30] The CCET is an evidence-based cognitive–behavioral relationship distress prevention program, constituted by six units that cover, beyond the enhancement of communication and problem-solving skills, the enhancement of couples' DC. It is 15 hours in length, generally offered as a weekend workshop, in a group setting of 4-8 couples. The program has been shown to be effective in improving relationship outcomes (e.g., relationship satisfaction, DC) and recent studies supported the efficacy of compact formats of the CCET as well as self-directed learning materials (Bodenmann, 2016; Bodenmann & Shantinath, 2004; Zemp, Merz, et al., 2017), which seems to be particularly advantageous for expecting couples and couples with a newborn. We are aware of ongoing work in the lab of Professor Guy Bodenmann (Switzerland) that aims to test the efficacy of the Couples Care and Coping Program (CCC-P), an evidence-based program offered to couples becoming parents, which combines CCET with Couple CARE for Parents (CCP; Halford, Petch, & Creedy, 2010), but information about the effectiveness of the program is not yet available. Since the CCET has been successfully implemented in Western cultures (Bodenmann, 2016) and strong reasons underline its relevance in the Portuguese context (due to the centrality of the romantic partner for Portuguese people; Aboim, 2006; Schoebi et al., 2010), we reinforce a statement of previous researchers

perinatal period through clinical trials, since all the empirical studies in research phase II ended with clinical implications that underscore the improvement and promotion of DC-based skills, and explore the role that variables identified as risk factors for poorer DC resources (e.g., EPDS ≥ 10, high attachment-related avoidance) and adjustment (e.g., low common DC) could play in the **selection of participants** for such interventions and as **moderators of intervention efficacy**.

Finally, although not directly driven from our empirical findings, there are other unanswered questions in the field of PPD prediction and DC that could be explored in future studies. First, future research should explore the **acceptability** (by health professionals and women) and **feasibility of the PDPI-R** as a component of routine perinatal care in Portuguese maternity settings, including the clinical effectiveness (e.g., what would be the impact of this screening on subsequent referrals as well as women's help-seeking behaviors and, in turn, in women's short and long term health outcomes?) and cost-effectiveness of its application, as these aspects would add insights into the implementation of psychosocial screening practices not only in Portugal but internationally (Felice et al., 2018). In addition, the clinical utility of conducting a psychosocial assessment of men should be further tested, since men may also develop PPD (Cameron et al., 2016; Goodman, 2004a; Paulson & Bazemore 2010; Wee et al., 2011). Second, while our study is unique in the field and stressed the relevance of studying the role of DC during the perinatal period, its replication in **different types of couples** (e.g., couples facing high-risk pregnancies such as twins' pregnancy; same-gender couples) and considering normative potentially **stress-inducing situations across this transition** (e.g., proximity of delivery time and time that participants returned to work after parental leave) is warranted.

5. Implications for clinical practice

The findings of this research project have important clinical implications at both an individual and a dyadic level. Figures 3 and 4 present an integration of these implications, for pregnancy and the postpartum period, respectively, proposing a general flow chart

(Vedes et al., 2016) that the adaptation of STM-derived interventions for Portuguese couples, either in perinatal or other community and clinical contexts, should be considered in further research.

that may guide the management of risk for PPD (individual level) and the promotion of couple's perinatal wellbeing (dyadic level). It should be noted that our results impede us to define, with precision, an intervention protocol to be implemented into the current maternity and primary healthcare services, but they highlight some preliminary recommendations that can guide the development of future intervention guidelines. The literature review on these topics and the direct contact with women and couples at the UnIP also contributed to the elaboration of the proposed guidelines.

5.1. Clinical implications at the individual (women) level

Alongside with perinatal depression and anxiety screening, recent international guidelines for the management of perinatal mental health advocate enquiring *all* women about past and current psychosocial risk factors acknowledged to be related to poor maternal health outcomes – the so called *psychosocial assessment* (Austin, 2004; Austin et al., 2017; Austin & The Marcé Society Position Statement Advisory Committee, 2014). From a clinical standpoint, the inclusion of routine psychosocial assessment into perinatal healthcare services has several benefits: (1) the facilitation of women-health professionals communication about psychosocial issues (which consequently may improve women's satisfaction with perinatal care); (2) the promotion of women and health professionals' awareness about perinatal mental health, including its detection and management; and, (3) the early detection of women at higher risk from developing PPD and, thus, the primary prevention of this serious clinical condition (Austin & The Marcé Society Position Statement Advisory Committee, 2014; Beck, 2002; Beck et al., 2006). Ultimately, this complementary assessment will not only have benefits for the woman but also for her family, if we consider the pervasive impact that PPD has on the entire family system (O'Hara & McCabe, 2013).

Despite these encouraging arguments for considering universal psychosocial assessment as part of routine perinatal care, coupled with the availability of comprehensive psychosocial services for further referrals, this practice still remains overlooked in Portuguese maternity or primary healthcare centers (Fonseca & Canavarro, 2017; Fonseca et al., 2015), and this may be due to the lack of reliable and valid instruments adapted for the Portuguese language (Pereira et al., 2016). The findings of our project contribute to overcome this barrier, by establishing the **good psychometric performance of the PDPI-R**, a brief inventory, of easy administration, completion and interpretation, aimed

at providing a comprehensive overview of the woman's risk for PPD. While we wait for further insights on the acceptability and suitability of the PDPI-R in Portuguese healthcare services, our findings constitute a first step towards the recommendation of its routine use in perinatal care, as it has been underscored in Australia (Hanna et al., 2004) and Italy (Oppo et al., 2009). Specifically, our findings offer preliminary recommendations[31] in terms of the timing of PDPI-R administration (*when*), the usefulness of PDPI-R components (*clinical interpretability*), and the steps that can be further adopted by the medical staff in function of the outcomes provided by the inventory (*clinical utility*). Figures 3 and 4 present an integration of these recommendations.

When. First of all, by showing the predictive validity for both versions of the PDPI-R, our findings support the usefulness of the inventory both during the prenatal period and the postpartum period. Regarding the **administration of the prenatal version of the PDPI-R**, our recommendations are drawn considering the second trimester of pregnancy as reference, but we consider that, in accordance with the Australian Guidelines, a first psychosocial assessment should be undertaken as soon as possible during pregnancy[32]. While we wait for further recommendations on this topic, our findings encourage the use of the prenatal version of the PDPI-R by health professionals that have regular contact with pregnant women between 12 and 26 weeks of gestation. On the other hand, our findings encourage the **readministration of the PDPI-R after childbirth** (postnatal/full version), regardless of the woman's prenatal score. This is consistent with the Australian Guidelines and The Marcé Position Statement, which endorse this reassessment, preferably between six and 12 weeks after childbirth. This postpartum assessment can be integrated into the follow-up routine obstetric appointment, which generally occurs at six weeks postpartum, either in our country and in many settings worldwide. The Australian Guidelines and The Marcé Position Statement suggest the combination of this risk assessment with a depression/anxiety screening tool, such as the EPDS.

[31] As stated in the Introduction, many of the recommendations related to conducting a psychosocial assessment concur across Australian Guidelines and The Marcé Position Statement. Accordingly, the recommendations driven from our empirical findings are interpreted in light of these evidence-based clinical practice guidelines.

[32] The testing of the PDPI-R in other trimesters of pregnancy was recommended in the appropriate section of this chapter.

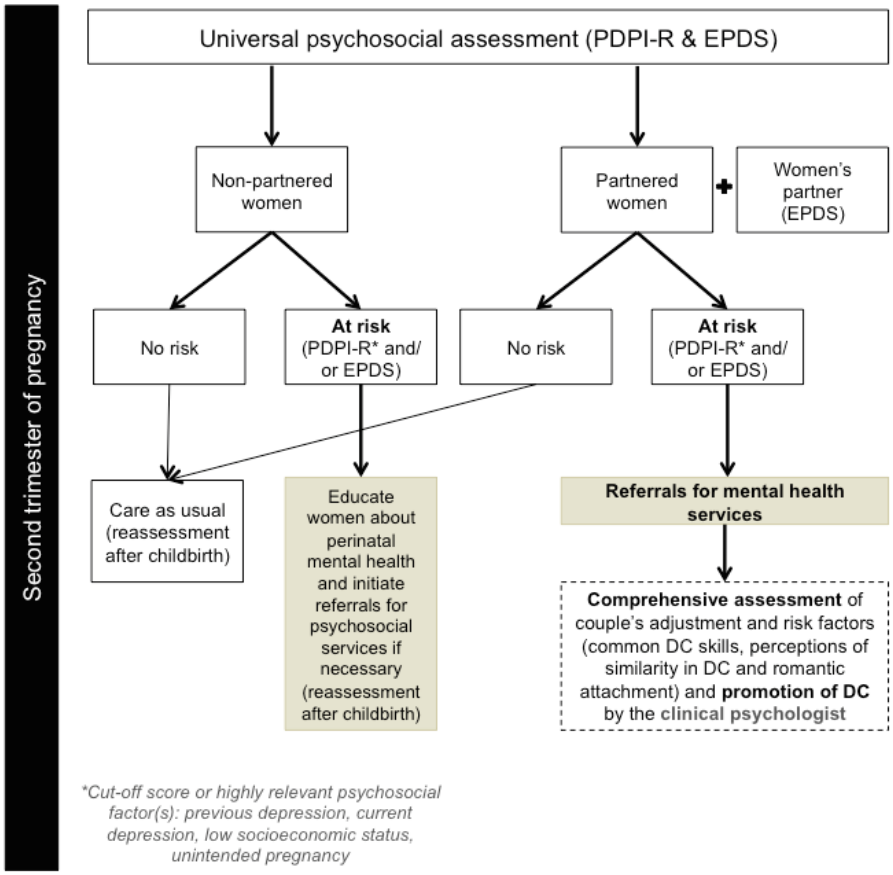

Figure 3 | Comprehensive integration of the clinical implications on the individual and dyadic levels (second trimester of pregnancy)

Specifically regarding the **screening for depressive/anxiety symptoms**, beyond the proposed assessments during the second trimester of pregnancy and at six weeks postpartum, our findings indicate that depressive and anxiety symptoms should be reassessed later in pregnancy (e.g., third trimester) and the former also reassessed later in the postpartum period (e.g., at six months postpartum); these follow-up assessments are also recommended by the Australian Guidelines. Depression/anxiety screening in the later postpartum period could be conducted in pediatric settings, as this is the most regular contact that women have with healthcare services after childbirth, and perinatal mental health screening in this context has been recommended by the American Academy of Pediatrics (Earls & The Committee on Psychosocial Aspects of Child and Family Health, 2010) and shown to be reasonably feasible (Liberto, 2012). Despite all these evidence-based guidelines, for obvious reasons, the ideal time for screening is, at the end, depending

on the available resources at a local health service level, and the need for repeat screening is depending on initial screening and clinical indications (Austin et al., 2017).

Clinical interpretability. Both versions of the PDPI-R (particularly the postnatal version) proved to be accurate in identifying women at higher risk for developing PPD considering the proposed PDPI-R thresholds. Therefore, the **total risk score** generated may be especially informative for risk-management in a less time-consuming manner and, thus, be particularly useful in the context of routine screening in overwhelmed maternity settings. In addition, the inventory entails the advantages of providing **scores for each risk factor individually**, and our results indicated that some of them independently put the woman at greater risk for PPD/symptoms thereof (see Figures 3 and 4). For instance, our results suggest that health professionals should explore women's social support networks after childbirth, as perceiving significant others as unavailable put them at particular risk for a PPD diagnosis. Therefore, a qualitative interpretation of the PDPI-R would provide additional information about women's risk, allowing to identify which life domains are more vulnerable, even if their total scores did not reach the proposed PDPI-R cut-off scores.

We highlight three additional notes on this topic. First, although our study contributed to the validation of the PDPI-R as a self-report questionnaire – which has advantages in providing a time-efficient summary of the woman's psychosocial context – it can also be used as an interview, as originally developed (Beck et al., 2006); thus, according to the Australian Guidelines, "different approaches can be taken to suit the setting, health professional confidence and skill set, as well as time constraints" (Austin et al., 2017, p. 31). Second, we have proposed more or less conservative cut-off scores as a function of the gold standards used (diagnostic interview vs. screening instrument, short vs. long term postpartum depressive symptoms); it is unlikely that all of these can be effectively integrated into a clinical screening setting, then the adoption of a particular threshold will depend on health professionals and healthcare services' specific interests. Finally, given the selective sample in our research, which restricted the generalizability of the findings, we advocate a careful use of the recommended cut-off scores in real-life.

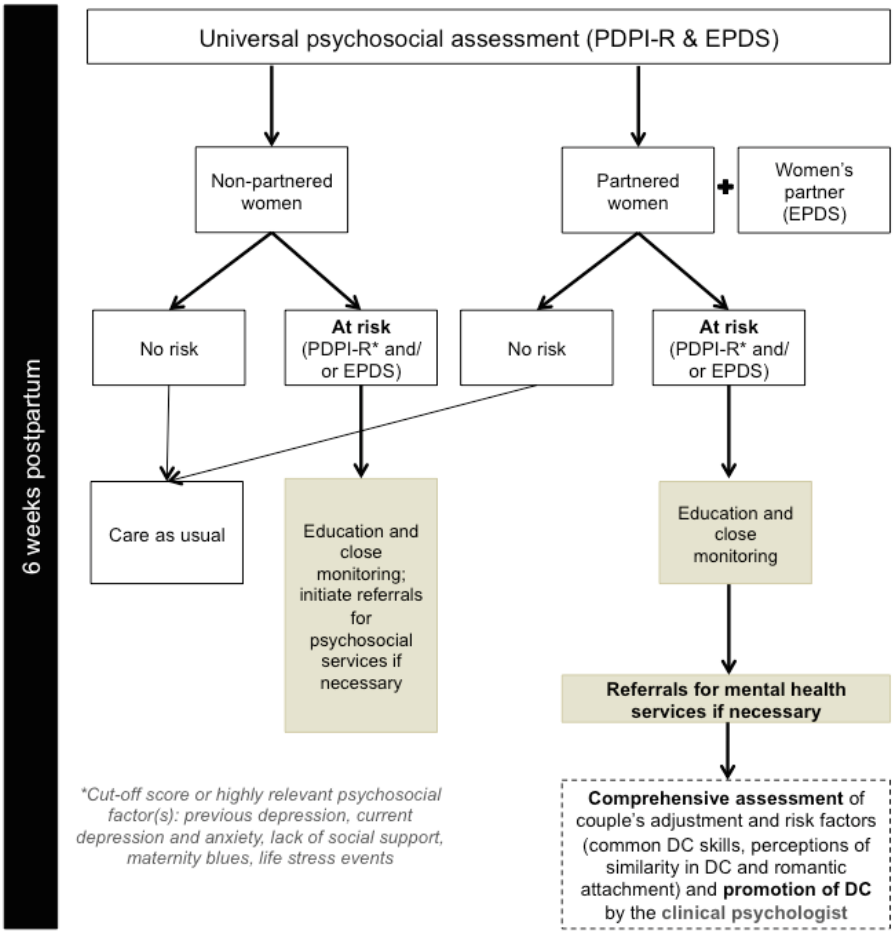

Figure 4 | Comprehensive integration of the clinical implications on the individual and dyadic levels (six weeks postpartum)

Clinical utility. According to the Australian Guidelines and The Marcé Position Statement, the implementation of screening practices should be integrated into routine antenatal and postnatal care and interlinked with systems for follow-up mental health care and support. The majority of women will not need further referrals or monitoring (negative PDPI-R test), but health professionals should be aware that a positive score on the PDPI-R should not be viewed as a *unique* condition to initiate referrals or offer additional support, given the high probability for having false positives when adopting the proposed cut-off scores (as noted previously in this chapter): approximately half (postnatally) or two thirds (prenatally) of the women with a positive PDPI-R screen would not, in fact, develop PPD. Consequently, unless the severity of the screening test results clearly indicate the need for further referrals (e.g., both PDPI-R and EPDS cut-off scores

are reached), a positive PDPI-R test indicates, in first hand, that she may benefit from education and a closer monitoring across the perinatal period.

We consider that (1) **discussing the test results** with the woman and providing the woman with **information about perinatal mental health** (e.g., that emotional difficulties are common during the perinatal period, some risk factors [for instance, those she has endorsed] may influence her mental health, and that psychosocial services such as psychological support are available), as well as (2) **closely monitoring** her risk and depressive symptoms (e.g., through monthly phone-calls) may constitute a better option to not disregard women with a positive PDPI-R screen, whilst minimizing financial and emotional costs associated with unnecessary referrals. Indeed, although psychosocial services are freely available in major Portuguese Public Maternity Hospitals and General Hospitals, the additional costs of conducting regular comprehensive psychological assessments may be counterbalanced by this more efficient distribution of health resources. In other words, the administration of the PDPI-R should be viewed, similarly to other screening tools, as a ***starting point*** for identifying women who enter the perinatal period with more vulnerability for developing clinically relevant postpartum depressive symptoms and, thus, should be accompanied by clinical judgment. Elaborating on all possible combinations of care options to respond to specific situations is beyond the scope of this discussion.

5.2. Clinical implications at the dyadic level

5.2.1. Inclusion of couples in perinatal (mental) health care

Several attempts have been made to foster the quality of the communication and problem-solving skills of couples transitioning to parenthood to help them in adjusting positively as partners and parents, with varying success (for reviews see Doss & Rhoades, 2017; Pinquart & Teubert, 2010). The enhancement of these skills was also a central component of the reviewed partner-inclusive interventions aimed at preventing/ treating PPD in women, of recent models developed to guide couple-based interventions for PPD (e.g., Cohen & Schiller, 2017), as well as of our clinical work with couples at the UnIP. However, generally, adaptive dyadic skills (e.g., positive communication within the relationship) often breakdown under situations of increased stress, namely situations of stress originated outside the relationship (Bodenmann & Shantinath, 2004). External stress

may spill over to the dyad and triggers internal dyadic stress such as arguments and tensions between partners (Bodenmann, 2000); indeed, the associations between stress and decreases in couple's functioning have been well-established (for reviews see Randall & Bodenmann, 2009, 2017) and could explain the impact of the transition to parenthood on couple's relationship functioning (Delicate et al., 2018; Doss & Rhoades, 2017). In this line of thought, "it is not sufficient to merely strengthen the communication and problem-solving skills of the partners. What also is needed is a means of promoting the coping skills of the couple." (Bodenmann & Shantinath, 2004, p. 479). The findings in the phase II of this research project inform clinical practice of potential coping resources that partners could use to help each other in situations of stress that should be considered into the psychosocial care of couples becoming parents for the first or second/third time (i.e., DC skills). Specifically, they inform about important steps towards the promotion of couple's positive adjustment, comprising five main approaches: (1) initial screening; (2) comprehensive assessment; (3) promotion of DC; (4) promotion of DC in the context of perinatal depression; and (5) universal awareness about DC.

5.2.1.1. Initial screening

First of all, perinatal mental health care should target both members of the couple, immediately from the **phase of assessment**. The first assessment should ideally be conducted **during pregnancy** (see Figure 3) and could be undertaken by the psychologist or by other health professionals with whom women/couples have more regular contact (e.g., nurses). According to our findings, beyond aspects that are already part of the routine perinatal care (e.g., inquiring about parity[33]), similarly as the outlined for women, **women's partners should be screened for depression** (which assumes even more relevance when their wife have a positive screen on the EPDS) and health professionals should be aware of the possibility and clinical impact of couple's comorbidity regarding depressive symptoms. Because delivering a psychological intervention to all couples expecting a baby would be unrealistic and inappropriate, along with the need of a more

[33] Health professionals (nurses and obstetricians) could inform and encourage first-time parents to attend the available educational classes during pregnancy, in which they can learn general coping strategies related to multiple aspects of the transition to parenthood (e.g., breastfeeding, birth expectations, childcare-related tasks, changes in close relationships) and then help them to enhance their QoL and reduce their psychological symptoms in the early postpartum period.

efficient allocation of health resources, conducting a psychosocial screening allows us **to identify the couples that could benefit most from preventive** (indicated/selective prevention) or **therapeutic approaches** during pregnancy or soon after childbirth. Once at-risk couples[34] have been identified, they should be **referred to perinatal mental health services** for a comprehensive psychological assessment (see Figures 3 and 4).

5.2.1.2. Comprehensive assessment

The clinical psychologist must conduct a comprehensive **assessment** of the **current difficulties** (e.g., high depressive symptoms) and the **risk factors for subsequent maladjustment** (e.g., low common DC skills, perceptions of low similarity in DC after childbirth, higher avoidant romantic attachment representations). When women are in a current romantic relationship without contraindications (e.g., presence of domestic violence, marital crisis), the inclusion of the partner in the assessment procedures should be proposed. This is particularly relevant when partner-related risk factors are present (e.g., poor relationship satisfaction, lack of partner support) or when women already present early-onset depressive symptoms before childbirth, as these couples tend to have poor marital functioning (Study III).

Regarding couple's adjustment, clinicians should adopt a multidimensional approach of adjustment indicators, as the one we privileged in our research, by considering not only the presence of psychopathological symptoms as an indicator of adjustment difficulties but also individual's functioning at other levels (e.g., QoL, parental confidence). Concerning DC dynamics, the clinical psychologist could **explore collaboratively what helps each partner's individually**, in terms of their own characteristics (i.e., the impact of the stress he or she communicates on his/herself, the support she/he gives and receives [at a time or jointly] and the similarity she/he perceives within the couple) as well as their partner's characteristics. The intention of this comprehensive assessment is to capture each partner's profile of specific perceptions and behaviors (enacted by themselves and

[34] At-risk couples represent those couples in which the woman presents psychological distress and/or risk factors for PPD, regardless of their partner's screening results. In line with the predominant focus of this PhD project on *hers* and *theirs* perspectives, it is beyond the scope of this discussion to elaborate on the clinical implications of cases in which only the woman's partner reports high levels of depressive symptoms (a topic referring exclusively to *his* perspective).

by their partners) that help or hinder their individual and parental adjustment. The benefits and costs of stress communication, support provision and joint coping efforts for each partner should be assessed, for example, by asking couples to share examples of recent dyadic interactions involving support requests/exchanges. The discussion of one's behaviors and perceptions of DC in the presence of the partner assumes particular relevance, as this can facilitate the **recognition of the mutual impact between partners** (i.e., their behaviors and perceptions have consequences both for themselves and their partners). This comprehensive assessment will therefore define specific objectives of intervention tailored to each partner's needs.

5.2.1.3. Promotion of DC

Couples with or at risk for poorer DC skills may benefit from **intervention strategies focused on strengthening DC**. There are two programs grounded in the STM that serve this purpose: The Couples Coping Enhancement Training (CCET; Bodenmann & Shantinath, 2004), a prevention model, and the Coping-Oriented Couple Therapy (COCT; Bodenmann, 2010; Bodenmann et al., 2008), a treatment model. Besides including classical components of cognitive-behavioral couples therapy, such as communication and problem-solving training, the distinctiveness of the CCET and COCT is the inclusion of psychoeducation about the role of daily extra-dyadic stress on couple's functioning and the 3-phase method, originally based upon the STM (Bodenmann, 1995, 2005) and stress and coping research in couples. The 3-phase method aims to improve dyadic stress communication and the DC repertoire of a couple, by helping partners to: (1) enhance the ability to effectively communicate stress to the other (phase 1); (2) adapt their support to the specific needs of the other (phase 2); and (3) refine the ability to offer DC based on the partner's feedback (phase 3). Through this therapeutic method, the therapist assumes the role of a coach that guides partners to better understand their own's and their partner's reactions to stress, namely how personally relevant schemas or patterns of thought may be triggered by daily hassles and hence cause stress; these insights may help partner to build up a mutual understanding of emotional stress experiences for both partners, engage in adequate emotion and problem-focused support (DC), which, in turn, strengthen feelings of "we-ness" in the relationship. These approaches have received considerable evidence supporting its efficacy in improving several relationship outcomes,

such as higher relationship satisfaction, positive communication and DC as well as individual outcomes such as depressive symptoms (Bodenmann, 2010; Bodenmann, 2016; Bodenmann & Randall, 2012; Bodenmann & Shantinath, 2004; Leuchtmann, Horn, Randall, Kuhn, & Bodenmann, 2018). Our findings suggest that STM-derived interventions may be relevant in the context of the transition to parenthood, yet they highlight some **special (re)considerations when working with couples in perinatal care settings:**

i. As a period of increased changes and reorganizations, couples may benefit from being trained about effective **stress communication skills** during the perinatal period, in order to make it easier to feel understood and supported by the partner. However, clinicians should be aware that partners might not feel equally comfortable with self-disclosure (as the men in our study) and that this process may have a negative impact on the partner who need to perceive and interpret the signals of stress (as for the men in our study). On one hand, men may effectively lack the ability to disclose and request support (and then would benefit from the training), however, it is also possible that they have the skills necessary but feel that they should avoid expressing stress and requesting support, in line with the traditional view of the men as the support provider and the women as the support recipient at this time (Darwin et al., 2017; Levy-Shiff, 1999; Mander, 2004). On the other hand, the reasons and mechanisms underlying the apparent negative impact of women's communication of stress on men (e.g., partners become stressed themselves and are unable to provide the support desired) should be addressed.

ii. Specific intervention strategies aimed at **helping couples engaging in joint coping efforts** might benefit members of a couple twofold: as an individual and as a parent. More than (exclusively) supporting men in their support provider roles, couples should be encouraged to reserve time for one another, to discuss each other worries and concerns, and seeking for solutions as a team. Clinicians can help couples in identifying daily life situations that can spill over to the dyad, so affecting both partners (e.g., stress with family of origin) and determining what common DC strategies can be applied. Importantly, because declines in common DC are likely to occur over the course of pregnancy until the period after childbirth and appear to be accompanied by similar declines in individual adjustment (as indicated in our study), common DC strategies should be addressed during pregnancy and boosted after childbirth; this is in line with the conclusions of a meta-analytic review that

highlight that couple's skills, such as communication, are likely to be enhanced if targeted both during pregnancy and after childbirth (Pinquart & Teubert, 2010). Moreover, common DC-enhancing interventions would probably reduce the likelihood of couples from experiencing psychological distress and parenting stress (negative dimensions of functioning) but also promote their positive wellbeing in multiple domains of life and confidence in their parental role (positive dimensions of functioning). On a related note, because indicators of individual and parental adjustment are strongly related to the quality of parent-child interactions and child's development outcomes (Crnic & Low, 2002; Field, 2010; Jones & Prinz, 2005; Kingston et al., 2012), the promotion of this dyadic resource would likely to be beneficial for the whole family.

iii. Clinicians should also be aware of potential **differences in the impact of common DC** for women and men, and explore the extent to which collaborative strategies of coping, as perceived by men, could have an adverse effect on them (as our results seem to indicate). In such cases, it can be helpful to discuss whether the strategies are unconstructive for the partner (and thus should be substituted) or if they are helpful to some degree but inconsistent with endorsed ideologies and beliefs surrounding fatherhood. Inquiring each partner about the degree to which they feel comfortable with joint coping efforts may help to elucidate about conflicting reactions (e.g., men's engagement in common DC was beneficial for their QoL but prejudicial for their parental confidence in our study) that should be addressed in clinical practice.

iv. While the identification of **risk factors for poorer common DC** (i.e., high depressive symptoms and attachment-related avoidance) informs clinicians about potential candidates to these interventions, this also informs about possible adjustments to be done in some components of STM-derived interventions. For instance, as the promotion of couple's resources involves the stimulation of feelings of connection and proximity, engaging in common stress management strategies may represent a real **challenge for individuals with more avoidant attachment representations** toward their partners. Conversely, the opportunity of the partner to modify his or her negative perceptions of other's, and developing a sense of closeness and commitment, may likely to occur by involving both members in the intervention sessions and training DC behaviors up to adaptive patterns based on

immediate feedback. For these reasons, and because changes in attachment representations are likely to occur during the transition to parenthood as a result of support-related experiences (Simpson et al., 2003), couples should be offered this possibility. The extent to which the 3-phase method works in couples with particular characteristics such as attachment insecurity remains an open question (Bodenmann & Randall, 2012), but it is reasonable to anticipate potential obstacles (e.g., during the deepened self-disclosure in phase 1).

v. Clinical psychologists should be aware of the **differences in the impact of perceived similarity in DC efforts** across the perinatal period. On one hand, in line with recent recommendations to enhance reciprocal partner support within couples during pregnancy and after childbirth (Pilkington, Milne, Cairns, & Whelan, 2016), our results suggest that promoting DC similarity or reciprocity between partners may constitute an important goal in interventions delivered *after childbirth*. The CCET includes a unit focused on strengthening equitable exchanges of DC, grounded on the assumption that fairness and equity within the relationship are important to maximize the effects of DC for both partners, while when absent they may originate stress within couples. In line with this, clinicians may help couples to be aware of the importance of mutual exchanges in DC and enhance the ability to detect inequality in the relationship (Bodenmann, 2016; Bodenmann & Shantinath, 2004). Especially, they can help couples to understand the importance of the partner's perceptions of similarity to the other's wellbeing even if the impact for the perceiver partner is less evident (as indicated in our study). Clinicians should be aware that couple's perceptions of similarity play a more important role than their actual similarity, thereby they not only need to assess each partner's perceptions about their DC efforts in response to the other's stress but also their perceptions of their partners' DC to respond to one's stress, and estimate the degree of perceived similarity or reciprocity for each member of a couple. On the other hand, *during pregnancy*, partners engaging in distinct DC responses to help the partner cope with their stress should be considered coping strategies with identical value and women and men individual concerns and needs of support should be given special attention during this more individualized phase.

vi. Overall, the consideration of the couple as the unit of intervention implies a **flexible approach**, in which idiosyncrasies between and within couples should be taken into

account. Indeed, the focus on the couple should not nullify a concomitant focus on the individual experiences of women and men. This aspect is particularly relevant in countries characterized by mixed (traditional and egalitarian) conceptions of motherhood and fatherhood, such as Portugal.

vii. Finally, even though our results cannot inform about which couples, in terms of parity (primiparous vs. multiparous), could benefit most from DC-based interventions, these interventions are likely to be **helpful for both first-time and experienced parents**, as they aimed at promoting skills that couples can use when facing a diversity of daily hassles that are not restricted to one scenario but rather can emerge in both situations.

5.2.1.4. Promotion of DC in the context of perinatal depression

Couples in which the woman presents **high levels of depressive symptoms during pregnancy** may benefit from coping-oriented couples therapy such as the COCT approach (Bodenmann, 2010), as they often experience low DC skills and marital adjustment (as shown in Study III). Even in the absence of significant marital distress, the COCT can be used with couples with a depressed partner, as it focus primarily in improving DC; in the context of depression, COCT components can include teaching partners of the depressed patients to differentiate between beneficial support and support that could reinforce depressive symptoms (Bodenmann et al., 2008). Also, as the psychological adjustment of partners is not independent from one another, mental health professionals should assist couples in *jointly* overcoming the psychological distress experienced (Bodenmann & Randall, 2013). The COCT was shown to be effective in the context of depression, namely in reducing couple's negativity (e.g., criticism) and improving patients' depressive symptoms (Bodenmann et al., 2008).

In this line of thought, although our recommendations regarding the promotion of DC were driven from empirical studies conducted in the broader context of the transition to parenthood (rather than specifically in the context of PPD), we hypothesize that DC-enhancing interventions can have meaningful effects to prevent or treating PPD among women, given the relevance of interpersonal dynamics for the development and maintenance of PPD. Specifically, combined with the findings of the systematic review (research phase III), the findings in **research phase II** suggest important

recommendations for future partner-inclusive interventions aimed at preventing and treating PPD among women[35], concerning the:

- **Content of the intervention:**

  DC skills

  The evidence that specific dimensions of DC were diminished in couples in which women present early-onset depressive symptoms during pregnancy and that DC influences partners' adjustment to this transition stimulates the exploration of these dyadic processes as potential relevant targets in PPD interventions; while couple-related dimensions were already considered in the reviewed interventions (e.g., partner support, communication), training couples about ways to effectively cope with stress, namely external stress, can be particularly relevant at this challenging time.

  PPD education

  Our systematic review showed that a psychoeducation component about PPD help women's partners to better understand their spouse's emotional difficulties. Accordingly, in line with recent recommendations to improve partners' experiences of women's perinatal mental health care (Taylor et al., 2018), mental health professionals should provide partners of women with evidence-based information about PPD (e.g., signs, symptoms, risk factors) and available support. This would help them to normalize some of the concerns experienced and foster their coping skills to deal with their spouse's (and possibly own) psychological distress.

- **Timing of the intervention**: the evidence that both prenatal and postpartum DC skills impact adjustment and that declines in common DC over time were associated with declines in adjustment motivate the consideration of both the prenatal and postnatal period to target couple-related skills; most of the preventive strategies

[35] The findings in research phase II suggest refinements to Be a Mom (the formative evaluation of Be a Mom is presented in Fonseca et al., 2018) if researchers intended to include the woman's partner in the intervention; in terms of: **content** (to consider a DC component; self-directed tools have been shown to be effective in improving DC skills [CCET-DVD; Bodenmann, Hilpert, Nussbeck, & Bradbury, 2014] and then can be easily integrated into Be a Mom); **timing of implementation** (to consider the postpartum period but also the prenatal period); and **participants** (to develop strategies to improve the participation of women's partner in the DC-based session).

summarized in our literature review covered, effectively, couple-level factors in the prenatal period with some of them including postpartum session(s), which suggests that this design is recommendable (until proven otherwise);

- **Subjects of the intervention**: although detailed guidelines concerning the involvement of the male partner in interventions targeting women's PPD still remain to be defined (as the reviewed empirical evidence was inconclusive on this topic), the strong interdependence between partners salient in all the empirical studies reinforces the relevance to continue investing in partner-inclusive interventions; accordingly, we assume that (at least) part of the program would benefit from covering DC skills considering the active participation of both partners; most importantly, although our systematic review focused on the role of the male partner in relation to women's mental health, we must recognize that, in light of the main conclusion of our empirical results (i.e., more than promoting men's support in response to women's needs, efforts should be made to help couples engaging in joint coping efforts), both partners should be the target of the intervention and deserve a comparable focus[36]. For obvious reasons, all these recommendations are not absolute and the presence of contraindications (e.g., presence of interpersonal violence) should be verified before the implementation of partner-inclusive interventions.

5.2.1.5. Universal awareness about DC

The implications drawn above inform clinical psychologists about evidence-based recommendations to be considered when working with more vulnerable couples. However, we are aware of some potential obstacles that may leave potential at-risk couples outside of selective prevention strategies (e.g., lack of initial screening due to time and education constraints, couples did not proactively seek help to manage their psychosocial difficulties) and, on the other hand, our research raises the issue of whether all couples (and not only those with particular characteristics such as attachment insecurity) would benefit from DC-based strategies that help them cope with everyday

[36] Additional implications for *research aimed at testing the efficacy* of partner-inclusive interventions include the relevance of assessing (a) the impact of the intervention on *both* members of the couple, considering multiple outcomes (positive and negative dimensions) and (b) potential mediators (e.g., changes in DC) and moderators (e.g., attachment-related avoidance) of intervention efficacy.

stressors surrounding the transition to parenthood and hence protect their relationship from the negative impact of external stress.

As a primary prevention approach, we consider that it might be worthy to implement alternative strategies to, at least, provide couples with some **information** regarding how their **couple's relationship** may act as a resource against the negative impact of everyday stress during the transition to parenthood. To this end, it could be helpful **to incorporate a module about DC into existing educational classes** (e.g., an educational part that address the impact of stress on couple's life and ways to protect their emotional, relational and parental wellbeing from external stress), **both during the prenatal and postnatal sessions** (if applicable). This recommendation is encouraging in light of the wide recognition that couples generally feel unprepared for changes in their relationship during the transition to parenthood (Delicate et al., 2018) and desire more information about potential relationship stressors and related coping strategies (Bäckström et al., 2017; Entsieh & Hallström, 2016). The fact that DC skills can also be applied in a variety of contexts such as personal and professional lives (and not only during the transition to parenthood) is highly attractive for men (Bodenmann & Shantinath, 2004); thus, the inclusion of a DC component could be an opportunity to better fit male partners' specific needs of information (e.g., appropriate strategies to support women, resources about communication skills and expression of needs; Bäckström et al., 2017; Darwin et al., 2017; Rominov et al., 2018) and, therefore, increase their involvement in perinatal education. Ultimately, this psychoeducation – which can be delivered either face-to-face or by means of self-directed learning materials (e.g., DVD; Bodenmann et al., 2014; Zemp, Merz, et al., 2017) – would probably encourage couples aware of the negative impact of stress on their relationship and experiencing first signs of crisis to proactively seek professional help.

On the other hand, there are reasons to assume that **well-adjusted couples may also benefit from a behavioral training** (as in the CCET program) that fosters couples' coping skills in order to prevent future declines in marital quality and satisfaction, which, as noted, are very common during the transition to parenthood (Delicate et al., 2018; Doss & Rhoades, 2017). However, these strategies will probably entail additional

costs and time restrictions (e.g., higher professional contact, room expenses), thereby a first assessment of its effectiveness is warranted before its wide implementation[37].

5.3. Implications at the institutional level

Addressing the aforementioned individual and couple level recommendations requires a paradigm shift in the current maternity and primary care services: on one hand, from a predominant approach centered on physical care to an approach that incorporates mental health care as part of holistic perinatal care and, on the other hand, from an approach exclusively centered on the woman and the baby to an approach that firmly considers the couple (or the whole family) as the unit of attention. Regarding the first aspect, our empirical findings indicate that initial efforts could be made towards an integrated psychosocial assessment in the Portuguese maternity and primary care settings, a practice that has been recommended by the most recent guidelines for perinatal mental health management (Austin et al., 2017; Austin & The Marcé Society Position Statement Advisory Committee, 2014). Concerning the second aspect, our findings support the view that the active involvement of both women and their partners should be promoted and optimized in perinatal (mental) health care services – in line with recent recommendations (e.g., Bateson, Darwin, Galdas, & Rosan, 2017; Pilkington, Whelan, et al., 2015; Taylor et al., 2018) – both in the broader context of the transition to parenthood and in the specific context of women's PPD. To this end, a coordinated multidisciplinary approach is warranted in maternity and primary care services.

5.3.1. Reconsidering perinatal healthcare services: What is the role of clinical psychologists?

As we stated in the Introduction, health professionals and women have, in general, positive views towards conducting a psychosocial assessment (e.g., Kalra et al., 2018;

[37] As previously noted, research to further elucidate on the efficacy of coping-oriented couple interventions specifically designed for the transition to parenthood (i.e., the CCC-P) is underway in Switzerland; a promising area for future work in the area of relationship research is to not only examine the clinical and cost effectiveness of these programs in other countries (such as in Portugal, as recommended in the appropriate section of this discussion) but also to explore moderators of the benefits of those interventions (e.g., universal vs. selective targeting of CCC-P). This knowledge will help to refine some of the clinical recommendations derived from our research project, such as whether coping-oriented couple interventions should be delivered to selected couples vs. all couples.

Matthey et al., 2005). However, beyond the lack of valid psychosocial screening tools, several barriers for this practice have been cited in the literature, including mostly limited time, education about and training in perinatal mental health issues, and availability of appropriate referral pathways (Connell, Barnett, & Waters, 2017). Among women, key barriers include stigma, lack of knowledge about "normal" vs. "abnormal" emotional reactions, preference to manage emotional difficulties on their own without professional assistance and to discuss their concerns with close significant persons, and normalization of their emotional experiences by significant others (Connell et al., 2017; Kingston et al., 2015); some of these factors also constitute main reasons why women do not proactively seek professional help to manage their psychological distress (Dennis & Chung-Lee, 2006; Fonseca et al., 2015; Hadfield & Wittkowski, 2017).

On the other hand, a greater inclusion of and attention to fathers (couples) in perinatal health services entail several practical barriers (e.g., time and funding constraints, inflexibility of appointment times; Rominov, Giallo, Pilkington, & Whelan, 2017), but predominantly obstacles related to societal attitudes towards masculinity and fatherhood (Bateson et al., 2017; Taylor et al., 2018), which are perpetuated by a lack of professional education and/or reflective supervision (Bateson et al., 2017). Men feel often marginalized in perinatal health care in general (Entsieh & Hallström, 2016) and perinatal mental health care in particular (Rominov et al., 2018; Taylor et al., 2018;) and want to be better involved and supported by health professionals. We consider that clinical psychologists working in maternity or primary health care settings may play an important role in minimizing some of these personal and system-related barriers at two levels: educational and clinical.

As part of a multidisciplinary team constituted by distinct health professionals (e.g., nurses, obstetricians, social workers), clinical psychologists may help to **promote health professionals (e.g., obstetricians, nurses) and women/couples' awareness** about several topics surrounding maternal and paternal perinatal mental health. On the one hand, clinical psychologists may share relevant information from research and their clinical practice in multidisciplinary case-planning meetings. In particular, they may provide training to health professionals in the administration, scoring and interpretation of the PDPI-R and EPDS, as well as help to establish clear management plans in terms of the steps that can be undertaken post assessment in terms of thresholds and/or specific risk factors (e.g., referral for a comprehensive mental health assessment). On the other hand, clinical psychologists may help to develop community-based educational campaigns/materials

addressing common emotional, dyadic and parental difficulties, risk and protective factors and contacts for psychosocial assistance, as well as specific contents to be included into the existing standard of educational classes[38]. At a clinical level, clinical psychologists are the health professionals certified to undertake **the comprehensive psychological assessment** of both women and their partners discussed above, and subsequently to **offer appropriate psychological support**. To this end, psychologists working in maternity and primary care settings should receive adequate professional training in perinatal mental health and couple-focused interventions (e.g., DC-promotion training).

We are aware of the low number of psychologists working in the healthcare settings in which most women are followed during the perinatal period (e.g., major Public Maternity Hospitals and General Hospitals) in Portugal; the implications drawn herein reinforce the pressing need to include clinical psychologists (beyond other relevant professionals such as social workers) in general and local maternity and primary care settings in order to provide women and men with access to appropriate early intervention and consequently to promote their adjustment to this such important period of life. As a final note, we would like to underscore that the extent to which implementing these recommendations would be cost and clinically effective are indispensable before changes in existing clinical practice (including specific-site protocols and policies) and, consequently, this remains an important avenue for future perinatal research in Portugal.

[38] In many countries, such as Portugal, expecting couples are offered free antenatal education classes in perinatal healthcare settings. In the current Portuguese legislation (Law n.° 7/2009, Article 46.°, Assembleia da República, 2009), the pregnant woman is entitled to waiver of work for prenatal obstetric appointments, and for the classes of preparation for childbirth, for the time and number of times necessary, while the father is allowed to three day offs to accompany the woman to prenatal appointments.

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