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Children mental health after the 2008 global economic crisis: Assessing the impact of austerity in Portugal

Diogo Costa[a,*], Marina Cunha[b], Cláudia Ferreira[b], Augusta Gama[a,c], Aristides M. Machado-Rodrigues[a,d], Vítor Rosado-Marques[a,e], Helena Nogueira[a,f], Maria-Raquel G. Silva[a,g], Cristina Padez[a]

[a] Research Centre for Anthropology and Health, Department of Life Sciences, University of Coimbra, Portugal
[b] CINEICC - Center for Research in Neuropsychology and Cognitive and Behavioral Intervention, Faculty of Psychology and Educational Sciences, University of Coimbra, Portugal
[c] Department of Animal Biology, Faculty of Sciences of the University of Lisbon, Portugal
[d] High School of Education, Polytechnic Institute of Viseu, Portugal
[e] Faculty of Human Kinetics, University of Lisbon, Portugal
[f] Department of Geography and Tourism, University of Coimbra, Portugal
[g] Faculty of Health Sciences, University Fernando Pessoa, Porto, Portugal

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ABSTRACT

Background: The austerity measures implemented in Europe after the 2008 global economic crisis, had a negative impact on the population health. The mental health of adults from southern Europe was particularly affected during this period, however, much less is known about the impact of austerity on the mental health of children. This study measured the impact on Portuguese children's mental health of specific changes in family life during the 2008 economic crisis.

Methods: In this study, a cross-sectional analysis of school-aged children (aged 7.5–11 years old, n = 1157) was conducted in 118 public and private schools of three Portuguese districts during 2016/2017. Parent reports of child's psychosocial functioning (Strengths and Difficulties Questionnaire – SDQ) and children self-reports of depression, anxiety and stress symptoms (Depression, Anxiety and Stress Scales, Children version – DASS-C) and health-related quality of life (HRQoL - KIDSCREEN-27), were compared according to eight yes/no questions specifically developed about changes to normal life during the economic crisis (e.g. During the economic crisis did you: "Started buying cheaper food?" "Had to change to more economic housing?"). General linear regression models were fitted to estimate mean scores of the selected mental health outcomes according to the positive or negative answers to each question about the changes to life during the economic crisis. The models were adjusted for age, sex, socioeconomic status and district of residence.

Results: Following the crisis 48.6% of the parents reported that they had to use their savings, and 6.8% reported that they had to change to a more economic housing. The questions about the changes to life that occurred during the crisis were associated with more frequent psychosocial problems, depression, anxiety and stress symptoms and with poorer HRQoL among children, after adjustment for potential confounders in the regression models. The effect sizes in mean differences for all mental health outcomes assessed according to the changes were small to moderate (Cohen's d from 0.01 to 0.68).

Conclusion: Specific changes to normal life attributed to the economic crisis seem to have an independent negative impact on the mental health outcomes of primary school-aged children. These results highlight the need to tackle early-life determinants of inequalities in children mental health, particularly among those that were exposed to the economic crisis.

* Corresponding author at: Research Centre for Anthropology and Health, University of Coimbra, Calçada Martim de Freitas, Edifício São Bento, 3000-456 Coimbra, Portugal.
E-mail address: diogo.costa@uc.pt (D. Costa).

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1. Introduction

The 2008 global economic crisis led several governments to implement austerity policies and measures to improve their national macroeconomic indicators (Basu et al., 2017). However, such policies and measures were followed by a vast array of negative social consequences, mostly felt after the economic crisis, namely, the increase of unemployment or employment insecurity, income instability, debts, homelessness, inequalities, poverty, social exclusion, food insecurity, to uncertainty towards the future and feelings of lack of control (Stuckler et al., 2017). These can all be considered risk factors to serious mental health problems.

In the southern European countries (Portugal, Spain, Greece and Italy), several studies have documented the deterioration of the individuals' physical and mental health attributed to the strict financial austerity measures adopted (Kentikelenis et al., 2011; Kondilis et al., 2013; Somarriba Arechavala et al., 2015; Catalano et al., 2011; Economou et al., 2016; Stuckler et al., 2017; Van Hal, 2015:17.). However, the scale of the effects of the recession on the mental health of Europeans may still not be noticeable for several years (Thomson et al., 2014) and may depend on several specific contextual factors, including existing social and individual protection, or the severity and duration of local austerity measures, for example (Dávila Quintana and González, 2009). In Portugal, the health-related austerity measures imposed were translated into a reform to the health system that, among other elements, increased the overall co-payments for users, a revision of the exemption categories and automatic indexation of co-payment rates with inflation (Legido-Quigley et al., 2016). There was also a reduction in public spending with pharmaceuticals (push in the prescription of generic medicines/ less costly medication), clearer prescribing guidelines for physicians that included electronic prescription for medicines and diagnostic exams. The primary healthcare sector was reinforced (namely through the increase of Family Health Units) and a performance-based payment implemented to decrease the frequency of specialist and emergency ambulatory care visits, thus reducing costs. Concentration and rationalization were also sought for hospitals and healthcare centers, with more rigorous control over working hours and reduction on overtime spending (Legido-Quigley et al., 2016).

The effect of austerity measures on the health of the Portuguese population has received less attention compared to other southern European countries, namely Greece or Spain. Data from the European Union Statistics for Income and Living Conditions (EU-SILC) show that the odds of unmet medical need more than doubled in the years following the crisis in Portugal (Legido-Quigley et al., 2016), but individual level data are scarce. Also, the results of the World Mental Health Survey Initiative conducted in 2008/2009 (adults, aged 18 years and older), pointed to a 12-month prevalence of mental illness of 22.9% in the country (National Epidemiological), which was particularly high compared to Italy (9.7%) and Spain (8.8%) (Antunes et al., 2018). Preliminary findings from a follow-up to this Portuguese national survey suggests an increase in the use of psychotropic medication, notably anti-depressants and anxiolytics from 2008/2009 to 2015 (Silva et al., 2017), and that the presence of mental disorder in the beginning of the economic recession years was associated with increased financial hardship (Antunes et al., 2018).

Less is known about the consequences of the economic crisis and subsequent austerity on infants' health, and particularly on their mental health (Paleologou et al., 2018; Rajmil et al., 2014). Exposure to socioeconomic harsh conditions or poverty during childhood may have an irreversible negative impact on later physical and mental health (Rajmil et al., 2014). Such exposure is associated with increased likelihood of traumatic events (e.g. violence) which, in turn, increases the risk of mental problems. Also, the experience of finance-related stress may lead to family conflict and increase the risk of harsher parental discipline practices or lack of support. Such exposure may also represent higher odds of living in a more disadvantaged neighborhood with physical and environmental characteristics that adversely impact mental health (e.g. violent crime and perceived safety) (Devenish et al., 2017; Straatmann et al., 2019).

It is important to also highlight that most adult mental disorders originate from childhood and adolescent experiences (Kim-Cohen et al., 2003), thus the long-term consequences of the economic crisis on children's mental health should be closely monitored. The importance of collecting data on children's mental health outcomes has also recently been noted by the World Health Organization for the European region, as there are visible gaps in data collection about the situation of children at risk of mental suffering (Situation of child and adolescent health in Europe, 2018).

Moreover, the consequences of early-life psychosocial distress may later translate into poor economic growth through low productivity and rising unemployment, which characterize individuals with poor mental health, thus fueling a cycle of worse mental health outcomes during adulthood (Egan et al., 2016; Frasquilho et al., 2015).

Worldwide, between 10% and 20% of children and adolescents suffer from mental disorders (Kieling et al., 2011). In Portugal, between 2011 and 2013, the number of children attending outpatient psychiatric consultations increased 23%, and the number of new consultations increased 30% (Augusto, 2014). During this crisis period, it is also known that a large proportion of children in Portugal were at-risk-of-poverty or social exclusion (e.g., among children aged 16 years or less, 27.7% in 2009, 27.1% in 2010, 27.7% in 2011, 27.0% in 2012, 30.8% in 2013 and 30.8% also in 2014 (Eurostat, 2019). Regardless of this knowledge, there is no recent published data on the prevalence of mental disorders in children or studies about the direct impact of the economic crisis on Portuguese children's mental health.

This study aims to measure how specific changes to family normal life, imposed by the 2008 global economic crisis, impacted the mental health of children attending primary school in Portugal.

2. Methods

2.1. Participants and procedures

Participants were recruited under the scope of a project aiming to assess inequalities in childhood obesity in the aftermath of the economic crisis in Portugal. This project followed the same methodological design as two previous surveys conducted with Portuguese primary school-aged children, aiming to assess childhood obesity prevalence (Padez et al., 2004), changes in prevalence estimates and the obesogenic environment (Machado-Rodrigues et al., 2018). In brief, the sampling procedure for the cross-sectional study conducted during 2009–2010 whose methodology was followed, was based on a stratified random design that accounted for the number of children by age and sex living in each Portuguese district, to provide a nationally representative survey of children aged 3–10 years. Schools were randomly selected in each district and year groups were selected within schools, with a total of 17,509 assessed at that time (Jago et al., 2012).

For the current study, schools participating in the 2009–2010 study from the districts of Coimbra, Lisbon and Porto were selected. Concise information letters describing the study's objective were sent and written consent for participation was asked to all parents. Between November 2016 and April 2017, a total of 13.787 invitations were sent and 8.472 school-aged children (mean age: 7.2 years, standard deviation: 1.9, 51% male), were recruited from 118 public and private schools from the three districts. Participation rates were 58% in Coimbra, 60% in Porto and 67% in Lisbon.

Additional written informed consent was asked to parents of children aged 7.5 years or older, for their participation in the school-based survey, specifically to answer the self-reported measures on mental health. Thus, of the 8.472 children, there were 3.967 eligible children for this study, which correspond to all children aged 7.5 years and older who were invited to answer the self-reported measures on mental

health. The analysis conducted in the present study was restricted to the sample of children who answered all mental health assessment tools and provided complete information. Therefore, the sample analyzed in this study is comprised by 1.157 children.

2.2. Parents

Father educational level (completed years of schooling) was used as a socioeconomic status (SES) indicator categorized in three levels: low (9 years of completed schooling or less), medium (secondary educational level or from 10 to 12 years of completed schooling) and high (at least university degree). Similar procedures were used in previous epidemiologic studies (Machado-Rodrigues et al., 2018).

Parents answered a set of eight yes/no questions about changes occurring during the economic crisis to the daily aspects of families' routine life. In specific, parents were asked if "During the economic crisis, did you: (i) had to use savings; (ii) had to resort to grandparents/other family members for help with food; (iii) had to resort to official entities for help with food (e.g. Charity, Food Bank, Other Association); (iv) had to change to a more affordable housing; (v) had to stop buying some food item that you used to consume; (vi)started buying cheaper food; (vii) did not change your habits; (viii) had to cut some entertainment (e.g. cable TV, internet access).

2.3. Children

Parents reported their child's sex as well as birth date. Age was computed in years at the time of contact with children.

2.3.1. Strengths and difficulties questionnaire

The Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) was administered to screen children's psychosocial functioning. The SDQ is a 25-item questionnaire answered by parents that has been translated to Portuguese (http://www.sdqinfo.org). The SDQ measures five psychosocial functioning areas: Emotional Symptoms, Conduct Problems, Hyperactivity, Peer Problems and ProSocial Behavior. Each subscale is composed of 5 items presenting statements about children behaviors or emotions, with three answering options (not true, somewhat true, certainly true). Higher scores in each subscale indicate more frequent problems. A total difficulties score is created by summing scores from all the scales except the ProSocial Behavior scale. In this sample, Cronbach alpha for the Emotional Symptoms subscale was 0.615, for the Conduct Problems it was 0.530, Hyperactivity was 0.751, Peer Problems was 0.546 and for the ProSocial Behavior was 0.706.

2.3.2. Depression, anxiety and stress scales

The children version of the 21 item Depression, Anxiety and Stress Scales – (DASS-C) (Pais-Ribeiro et al., 2004; Lovibond and Lovibond, 1995), translated to Portuguese, was answered by children aged 7.5 years and older, at school. Respondents were asked to refer to the previous week and provide their answer in a 4-option Likert scale (0 - Did not apply to me at all; 1 - Applied to me to some degree, or some of the time; 2 - Applied to me to a considerable degree, or a good part of time; 3 - Applied to me very much, or most of the time) regarding each item. Each subscale is composed of 7 items that refer to negative emotional symptoms. Items in each subscale are summed (scores vary between 0 and 21) and higher scores indicate more frequent symptoms. Cronbach alphas were 0.759 for the Depression subscale, 0.744 for the Anxiety subscale and 0.786 for the Stress subscale.

2.3.3. Kidscreen-27

The Portuguese version of the KIDSCREEN-27 was administered to children aged 7.5 years or older, to assess health-related quality of life (HRQoL) (Gaspar and Matos, 2008; Ravens-Sieberer et al., 2007). The 27-item KIDSCREEN, evaluates the following dimensions of HRQoL: Physical Well-being (5-items); Psychological Well-being (7-items); Autonomy & Parent Relations (7-items); Social Support & Peers (4-items); School Environment (4-items). The first item pertains to children general health status ("excellent/very good/good/fair/poor"). The remaining items present a five-point answer option: "not at all/slightly/moderately/very/extremely" or "never/seldom/quite often/very often/always" (Costarelli et al., 2013). Following the KIDSCREEN-27 Manual (The KIDSCREEN Group Europe, 2006), each dimension of the questionnaire was transformed into Rasch scales and then translated into T-values, obtained by using a specific syntax developed by the KIDSCREEN group. Higher scores in each dimension of the KIDSCREEN-27 indicate a better HRQoL. Cronbach alphas obtained in this sample to each dimension were: 0.766 Physical Well-being, 0.770 Psychological Well-being, 0.751 Autonomy & Parent Relations, 0.835 Social Support &Peers and 0.802 School Environment.

2.4. Ethical issues

The Portuguese General Directorate of Education (Portuguese Government) approved the final study protocol (Registration number 0565500003) and approval was also obtained from the Portuguese Data Protection Authority (CNPD, authorization number 745/2017).

2.5. Data analysis

Counts and proportions, means and standard deviations were calculated for categorical and continuous variables description.

General Linear Regression Models were fitted to estimate adjusted mean scores of the SDQ total score, SDQ subscales, DASS-C subscales and KIDSCREEN-27 dimensions, according to the answers about changes occurring during the crisis. Models were adjusted for children sex, age, socioeconomic status and district of residence, considered potential confounders. Pairwise comparisons between "yes/no" answers to each question were performed using a Bonferroni correction for multiple comparisons.

Independent-samples *t*-tests were used to compare mean scores of the SDQ total score, SDQ subscales, DASS-C subscales and KIDSCREEN-27 dimensions, between respondents' answers (yes/no) to each question about changes occurring during the crisis. Cohen's *d*, as a measure of effect size of the mean differences was computed for each pair of answers. Results from the *t*-tests and Cohen's *d* are presented as supplementary material. Parameter estimates for the General Linear Regression Models fitted are also presented as supplementary material. Regression models for the SDQ Total score (summarizing the SDQ dimensions), and the questions about the crisis, stratified by parental education (three levels) and adjusted for sex, age and district of residence were also fitted and are presented as supplementary material.

Analysis was conducted using SPSS v25.

3. Results

The sample included in the analysis was composed of 603 girls and 554 boys. A total of 40.1% belonged to a high socioeconomic status (father education correspondent to at least university level). In total, 53.7% of children resided in Coimbra district, 32.7% in Lisbon and 13.7% in Porto (Table 1). Included and excluded children differed according to sex (slightly more girls included), mean age (slightly older children included), district of residence (proportionally more children from Coimbra and Porto included) and socioeconomic status (with included children more frequently in a higher SES group).

Regarding changes occurring during the economic crisis, 48.6% of parents of children included in the analysis reported that they had to use their savings, 20.3% had to resort to grandparents or other family members for help to buy food and 4.3% had to resort to official entities for food. Also, 6.8% referred having to change for a more economic or affordable housing following the economic crisis. Almost 22% of parents reported they had to stop buying some food item that they used to

Table 1
Sample characteristics.

		Included		Excluded	
		n (or mean)	% (or sd)	n (or mean)	% (or sd)
Sex	Boys	554	47.9	1470	52.3*
	Girls	603	52.1	1340	47.7
Age		8.80	0.76	8.59	0.87*
District	Coimbra	621	53.7	855	30.4*
	Lisbon	378	32.7	1214	43.2
	Porto	158	13.7	741	26.4
Socioeconomic status	Low	265	24.2	640	29.0*
	Medium	391	35.7	850	38.5
	High	439	40.1	720	32.6
During the economic crisis:					
Had to use savings	Yes	538	48.6	1171	51.9
	No	568	51.4	1085	48.1
Had to resort to grandparents/other family to help with food	Yes	225	20.3	573	25.6*
	No	881	79.7	1665	74.4
Had to resort to official entities to help with food (Charity, Food Bank, Other Associations)	Yes	48	4.3	188	8.2*
	No	1069	95.7	2094	91.8
Had to change to more economic housing	Yes	76	6.8	277	12.3*
	No	1034	93.2	1982	87.7
Had to stop buying some food item that you used to consume	Yes	243	21.8	559	24.5
	No	870	78.2	1723	75.5
Started buying cheaper food	Yes	368	34.2	848	38.7*
	No	708	65.8	1344	61.3
Did not change our habits	Yes	413	38.4	748	34.1*
	No	663	61.6	1444	65.9
Had to cut some entertainment (e.g. Cable TV, internet)	Yes	100	9.3	286	13.0*
	No	979	90.7	1907	87.0
Strengths and Difficulties Questionnaire (SDQ)	Total score	9.82	5.06		
	Emotional Symptoms	2.41	1.85		
	Conduct Problems	1.75	1.45		
	Hyperactivity	4.31	2.45		
	Peer Problems	1.35	1.51		
	Pro Social	8.66	1.59		
KIDSCREEN-27 questionnaire	Physical well-being	56.23	10.95		
	Psychological well-being	57.56	11.37		
	Autonomy & Parents relations	51.71	11.58		
	Social support & peers	54.63	10.64		
	School environment	57.29	10.40		
Depression, Anxiety and Stress Scale – Children (DASS-C)	Depression symptoms	2.34	2.93		
	Anxiety symptoms	2.01	2.68		
	Stress symptoms	2.86	3.19		

sd: standard deviation; Included and Excluded based on full valid answers to the SDQ, KIDSCREEN-27 and DASS-C questionnaires; *$p < 0.05$ for Chi-squared or t-tests comparing Included vs. Excluded.

consume and 34.2% said they started buying cheaper food during the crisis. Conversely, 38.4% responded that they did not change their habits and 9.3% reported having to cut expenses on entertainment (such as cable television or internet).

Included children differed from excluded children in the answers given by their parents to the questions about the changes occurred during the crisis, with proportionally more positive answers among the excluded, except for having had to use savings and having to stop buying some food item that they used to consume.

Considering the SDQ Total score (psychosocial functioning), individuals that answered "yes" presented a statistically significant higher estimated mean than respondents answering "no" to all questions (Table 2), with the exception of the question about "not having to change habits" for which the estimated mean was higher among those answering "no".

The Emotional SDQ subscale estimated mean was significantly higher for children whose parents had to change habits during the crisis compared to those who did not change their habits, except for the questions on "having to resort to official entities to help with food" and "having to change to more economic housing" (non-significant).

For the Conduct Problems subscale, the estimated mean was significantly higher for those who had to change their habits, except for "having to use savings", non-significantly different. Hyperactivity was higher among those who changed their habits, exception for the questions on "having to resort to official entities to help with food" and "having to cut some entertainment", where means did not differ significantly. The Peer Problems estimated means were significantly higher for "yes" compared to "no" answers except for the question about "starting to buy cheaper food". For the ProSocial subscale, the only significant difference was noted for the question about "having to stop buying some food item that they used to consume", where a higher mean was observed for "no", compared to "yes" answers.

Mean scores in the DASS-C (depression, anxiety and stress) were consistently higher for children whose parents answered "yes" to the economic crisis impact questions, compared to those answering "no" (Table 2). Statistically significant differences were not observed for the Depression subscale mean regarding the questions on "having to use savings" and on "not changing habits", and for the Stress subscale, regarding the question on "starting to buy cheaper food". For the three subscales, estimated means were higher for those whose parents answered that they "did not have to change habits" during the crisis, compared to those who did.

Lower estimated mean scores on all HRQoL dimensions (Table 3) were generally observed among participants answering affirmatively (vs. negatively), to the questions about changes during the crisis (except for the question "did not change our habits").

Table 2
Estimated means for the Strengths and Difficulties Questionnaire (SDQ) and the Depressive Anxiety and Stress Scales-Children (DASS-C) according to the questions on how the economic crisis impacted life, adjusted for sex, age, district and socioeconomic status.

		SDQ						DASS		
During the economic crisis did you:		Total SDQ score mean (se)	Emotional Symptoms mean (se)	Conduct Problems mean (se)	Hyperactivity mean (se)	Peer Problems mean (se)	ProSocial mean (se)	Depressive symptoms mean (se)	Anxiety Symptoms mean (se)	Stress symptoms mean (se)
Had to use savings	**Yes**	10.65 (0.23)*	2.68 (0.09)*	1.91 (0.07)	4.59 (0.11)*	1.48 (0.07)*	8.66 (0.08)	2.54 (1.14)	2.18 (0.13)*	2.99 (0.15)*
	No	9.54 (0.23)	2.31 (0.09)	1.74 (0.07)	4.22 (0.12)	1.27 (0.07)	8.60 (0.08)	2.23 (1.14)	1.84 (0.13)	2.61 (0.15)
Had to resort to grandparents/other family to help with food	**Yes**	11.33 (0.36)*	2.81 (0.14)*	2.01 (0.10)*	4.89 (0.18)*	1.61 (0.11)*	8.61 (0.12)	2.93 (0.21)*	2.40 (0.19)*	3.45 (0.22)*
	No	9.72 (0.20)	2.40 (0.07)	1.75 (0.06)	4.27 (0.10)	1.30 (0.06)	8.66 (0.06)	2.18 (0.11)	1.88 (0.10)	2.61 (0.12)
Had to resort to official entities to help with food (Charity, Food Bank, Other Associations)	**Yes**	12.08 (0.80)*	2.81 (0.31)	2.40 (0.23)*	4.92 (0.39)	1.95 (0.24)*	8.26 (0.26)	3.71 (0.47)*	3.12 (0.43)*	4.01 (0.50)*
	No	9.99 (0.18)	2.48 (0.07)	1.79 (0.05)	4.37 (0.09)	1.35 (0.05)	8.67 (0.06)	2.28 (0.11)	1.95 (0.10)	2.75 (0.11)
Had to change to more economic housing	**Yes**	11.98 (0.60)*	2.72 (0.23)	2.32 (0.17)*	5.19 (0.29)*	1.75 (0.18)*	8.57 (0.19)	3.65 (0.35)*	2.84 (0.32)*	4.33 (0.37)*
	No	9.91 (0.18)	2.48 (0.07)	1.77 (0.05)	4.33 (0.09)	1.34 (0.05)	8.66 (0.06)	2.24 (0.11)	1.93 (0.10)	2.67 (0.11)
Had to stop buying some food item that you used to consume	**Yes**	11.28 (0.33)*	2.78 (0.13)*	2.01 (0.10)*	4.91 (0.16)*	1.58 (0.10)*	8.46 (0.11)*	2.84 (0.20)*	2.35 (0.18)*	3.20 (0.21)*
	No	9.72 (0.19)	2.40 (0.07)	1.75 (0.06)	4.26 (0.10)	1.31 (0.06)	8.71 (0.06)	2.21 (0.12)	1.90 (0.11)	2.68 (0.12)
Started buying cheaper food	**Yes**	11.00 (0.27)*	2.77 (0.11)*	1.97 (0.08)*	4.75 (0.14)*	1.51 (0.08)	8.59 (0.09)	2.66 (0.16)*	2.28 (0.15)*	3.08 (0.18)
	No	9.67 (0.21)	2.34 (0.08)	1.77 (0.06)	4.23 (0.11)	1.32 (0.07)	8.66 (0.07)	2.24 (0.13)	1.91 (0.12)	2.71 (0.14)
Did not change our habits	**Yes**	9.42 (0.26)*	2.27 (0.10)*	1.76 (0.08)	4.13 (0.13)*	1.25 (0.08)*	8.65 (0.09)	2.19 (0.16)	1.82 (0.14)*	2.49 (0.17)*
	No	10.58 (021)	2.63 (0.08)	1.89 (0.06)	4.59 (0.11)	1.47 (0.07)	8.63 (0.07)	2.51 (0.13)	2.17 (0.12)	3.06 (0.14)
Had to cut some entertainment (e.g. Cable TV, internet)	**Yes**	12.05 (0.52)*	3.30 (0.20)*	2.17 (0.15)*	4.77 (0.26)	1.82 (0.15)*	8.49 (0.17)	3.40 (0.31)*	2.91 (0.28)*	4.13 (0.33)*
	No	9.90 (0.18)	2.41 (0.07)	1.81 (0.05)	4.37 (0.09)	1.32 (0.06)	8.66 (0.06)	2.27 (0.11)	1.92 (0.10)	2.71 (0.12)

se: standard error; variables entered in each model: socioeconomic status (3 categories – high, medium, low, based on father educational level); sex (male, female); age (continuous); district (3 categories – Coimbra, Lisbon, Porto); pair-wise comparisons performed using Bonferroni correction; *mean difference is significant at 0.05 level.

Table 3
Estimated means for the KIDSCREEN-27 dimensions according to the questions on how the economic crisis impacted life, adjusted for sex, age, district and socioeconomic status.

During the economic crisis did you:		Physical well-being mean (se)	Psychological well-being mean (se)	Autonomy & Parent relations mean (se)	Social support & peers mean (se)	School environment mean (se)
Had to use savings	**Yes**	55.22 (0.52)	57.36 (0.55)	51.19 (0.55)*	54.67 (0.51)	56.32 (0.49)*
	No	56.51 (0.53)	57.70 (0.55)	52.70 (0.56)	54.32 (0.51)	57.64 (0.50)
Had to resort to grandparents/other family to help with food	**Yes**	53.63 (0.79)*	55.53 (0.83)*	49.90 (0.84)*	53.01 (0.78)*	55.52 (0.75)*
	No	56.54 (0.43)	58.18 (0.46)	52.57 (0.46)	54.94 (0.43)	57.51 (0.41)
Had to resort to official entities to help with food (Charity, Food Bank, Other Associations)	**Yes**	49.62 (1.78)*	50.01 (1.85)*	46.32 (1.89)*	47.21 (1.74)*	52.68 (1.67)*
	No	56.15 (0.40)	57.77 (0.41)	52.15 (0.42)	54.76 (0.39)	57.22 (0.37)
Had to change to more economic housing	**Yes**	52.63 (1.33)*	52.88 (1.39)*	46.40 (1.41)*	49.34 (1.30)*	52.53 (1.25)*
	No	56.19 (0.40)	57.92 (0.42)	52.44 (0.42)	55.01 (0.39)	57.49 (0.38)
Had to stop buying some food item that you used to consume	**Yes**	54.06 (0.75)*	56.42 (0.78)	50.11 (0.79)*	52.96 (0.73)*	55.65 (0.70)*
	No	56.44 (0.44)	57.75 (0.46)	52.41 (0.46)	54.93 (0.43)	57.46 (0.41)
Started buying cheaper food	**Yes**	54.13 (0.62)*	56.77 (0.65)	50.25 (0.66)*	53.11 (0.61)*	55.26 (0.58)*
	No	56.62 (0.48)	57.74 (0.50)	52.66 (0.51)	54.88 (0.47)	57.75 (0.45)
Did not change our habits	**Yes**	56.51 (0.59)	57.89 (0.62)	53.11 (0.63)*	54.77 (0.58)	58.07 (0.56)*
	No	55.26 (0.48)	57.09 (0.50)	51.01 (0.51)	53.93 (0.47)	56.13 (0.45)
Had to cut some entertainment (e.g. Cable TV, internet)	**Yes**	53.41 (1.16)*	54.88 (1.22)*	50.21 (1.24)	51.99 (1.14)*	54.86 (1.09)*
	No	56.17 (0.42)	57.83 (0.44)	52.06 (0.44)	54.73 (0.41)	57.25 (0.39)

se: standard error; variables entered in each model: socioeconomic status (3 categories – high, medium, low, based on father educational level); sex (male, female); age (continuous); district (3 categories – Coimbra, Lisbon, Porto); pair-wise comparisons performed using Bonferroni correction; *mean difference is significant at 0.05 level.

Despite this pattern, differences in mean scores did not reach statistical significance for some of the questions: for example mean scores of the Physical well-being, Psychological well-being and Social Support subscales were not statistically different for the question about "having to use savings".

Parameters estimates from the General Linear Models fitted to estimate the adjusted mean scores are shown in Supplementary Tables 5–6.

Small to moderate effect sizes according to Cohen's *d* were observed when comparing mean scores, using independent samples *t*-tests as shown in supplementary material (Supplementary Tables 1-4).

4. Discussion

Overall, this study results suggest that the changes to family life attributed to the 2008 economic crisis might have negatively affected the mental health of Portuguese primary school-aged children.

The specific changes analyzed in this study might be grouped into three themes: those related to financial constraint (had to use their savings during the economic crisis, had to change to more economic housing); related to food practices (had to resort to grandparents, other family members or official entities for help to get food, stopped buying some food items, started buying cheaper food); and related to the need to cut some entertainment such as cable television or internet. All these changes were associated with worse psychosocial functioning, with more frequent symptoms of depression, anxiety and stress and with worse scores in health-related quality of life.

The difference in estimated means for the psychosocial functioning and HRQoL pointed congruently to worse outcomes for those declaring a negative change following the crisis, independently of children' age, sex, parental socioeconomic status and district of residence. Despite it, only small to moderate effect sizes were observed between mean differences for all the questions (supplementary material). This suggests a greater relevance at the population (vs. clinical) level.

A major strength of this study lies in children' mental health assessment which was performed using children self-reported standardized instruments (DASS-C and KIDSCREEN), together with parents' reports of their child difficulties (SDQ), since most research use only parental measures to assess mental health outcomes of school-aged children.

This study used a set of questions to measure changes during the crisis developed by researchers with experience in socioeconomic inequalities of health. However, these questions were not previously validated, thus it is not possible to comment on their reliability. Meaningful changes might have not been measured (such as changes in family composition, employment status/income, school attended), that could have suggested other possible pathways linking the impact of the crisis to children mental health outcomes. Nevertheless, all questions were pre-tested, and participants did not reveal major difficulties in answering or understanding this particular section of the questionnaire. Furthermore, one of the items was inversely phrased ("did not change habits"), and the association observed between this item and the mental health scores for the three instruments went in the opposite direction of all other items thus, adding to the construct validity of these questions.

A large number of children were excluded from the analysis due to missing information in the mental health outcome variables and, despite still being a large enough sample to provide valid information, it is not possible to assert that it is representative of primary school-aged children in Portugal. Furthermore, the negative associations found between the crisis questions and the mental health outcomes measured may correspond to an underestimation considering that: excluded children were more frequently from a low SES group; that they answered more often positively to the crisis questions; and that a higher non-response rate may be expected among economically precarious households, provided the nature of this crisis. Our models were adjusted for district of residence and parental educational level, however, it should be noted that two previous works conducted within this project found that a disadvantaged SES was associated with more frequent symptoms of stress, that children from Lisbon had more frequent symptoms of anxiety, depression and stress compared to children from Porto and Coimbra (Costa et al., 2020), and that HRQoL was also worse according SES levels, particularly among normal weighted children (Costa et al., 2020). We also conducted a sensitivity analysis and fitted regression models for the SDQ Total score (summarizing the SDQ dimensions), and the questions about the crisis, stratified by parental education (three levels) and adjusted for sex, age and district of residence. We present the estimated means for each category and signaled significant differences in the pair-wise comparisons performed using Bonferroni correction (comparing "yes" vs. "no" answers for each crisis question). The results from this stratified analysis (Supplementary Table 7), are in line with the previously described results, i.e., positive answers to the questions about changes occurring during the economic

crisis were associated with higher estimated mean total scores in the SDQ (adjusted for sex, age and district), thus suggesting that the impact of the crisis to children psychosocial functioning was present across the three levels of socioeconomic status (parental education).

Since these questions were administered during the 2016–2017 period with reference to the crisis period (parents are likely to think of the period 2008–2012), we cannot rule out the possibility of a recall bias, where those who suffered only minor strain did not value the changes that occurred.

Also, the cross-sectional design of the present study, does not allow drawing inferences on causality.

Parents were asked to retrospectively reflect on a period when their children were much smaller, which means that the changes occurred during the crisis might have had a measurable impact years later. This is in line with longitudinal studies that have shown, for example, that socio-emotional behavioral problems at age 11 years are linked with factors collected in the first 3 years of life, particularly socioeconomic factors (Straatmann et al., 2019).

Our analysis was adjusted for socioeconomic status, provided that socioeconomic disadvantaged families were expected to be more at risk of making the listed changes during the crisis and having children with poorer mental health outcomes. It is also plausible to think that parents tried to shield their children from the consequences of resorting to help for food or changing to more economic housing and these children might never be aware that their parents needed help during the crisis. Although individual resilience factors were not assessed, these results suggest a non-negligible effect in children mental correlates beyond what could be expected from the exposure to a disadvantaged socioeconomic condition. We adjusted our analysis to father educational level, which is a commonly used indicator of social classes distribution in studies using children samples (Galobardes et al., 2007) and is fairly stable compared with other indicators, such as income or occupation. We found the same trend of lower mean scores in the mental health outcomes of children whose parents answered positively (compared to negative answers) to the crisis questions, also when stratifying the analysis by father educational level (Supplementary Table 7). This may indicate that the changes attributed to the crisis period affected all socioeconomic status groups, even though less frequently in the higher levels. For example, only five participants whose fathers had higher educational level reported having to resort to official entities for help with food, and ten participants from this educational group responded that they had to change to more economic housing.

Still, the potential for residual confounding cannot be ruled out and future studies should consider other social status indicators that could reveal different aspects of the relation between socioeconomic factors and mental health outcomes in children.

The results of the current study regarding the effect over food practices, are aligned with a large Greek epidemiologic study assessing the adverse effects of the crisis in the development of adolescent psychiatric symptomatology (Paleologou et al., 2018). The analysis of 2150 adolescents from Athens showed that adolescents reporting that there was not enough food in their house during the previous month had higher odds of mental health problems compared with those who answered having enough food (OR = 5, 95% CI = 2.87–8.72 for total SDQ score).

The changes related to food practices observed in our study, might be considered one of the harsher effects associated with the crisis, once families constrained in their choices, will likely resort to cheaper food items that are low-quality and with less nutritional value (Darmon and Drewnowski, 2015). Low quality diet is, in turn, associated with poor mental health in children and adolescents (O'Neil et al., 2014). It is, therefore, very important to address this issue with preventive actions that can ensure access to high quality nutrition early in life among those most impacted by the crisis.

Our results are also aligned with a before-after analysis conducted in Spain of more than 2000 children aged 14 years and less, in the scope of the Catalonia Health Survey. The latter study showed that disparities in HRQoL (KIDSCREEN-10) appeared during the crisis period, with children from families with a maternal primary education presenting lower HRQoL (Rajmil et al., 2013). Furthermore, inequalities on mental health correlates, as measured with the SDQ, persisted from one period of analysis to the other, according to maternal educational level and employment status (lower educational level and unemployment associated with increased total difficulties scores in the SDQ).

Regarding the effect observed over financial constraint, our results are in line with an analysis conducted within the Millennium cohort (UK) that followed more than 13.000 children from 2008 to 2012, aged 7–11 years old. In the Millennium cohort, those experiencing increased financial strain presented an increased risk of overweight/obesity, parent- and teacher-reported problematic behavior, long-standing illness and bedwetting (Mckenna et al., 2017).

Life-course approaches have clearly linked early-life socioeconomic conditions to depression (Gilman et al., 2002) and poor psychosocial functioning (Harper et al., 2002). Clear pathways and causal mechanism through which exposure to social adversity early in life have a negative impact on adult mental health should be identified in future research. Besides, individuals from socioeconomically disadvantaged backgrounds are more likely to experience other adverse stressful life events, known to influence mental health, such as violence, family conflict or lack of support (Devenish et al., 2017; Straatmann et al., 2019). Our findings, linking the exposure to a crisis-aggravated financial strain with children mental health outcomes constitute relevant epidemiological information, raising awareness to the potential negative impact that the crisis might have for these children.

5. Conclusion

The results of this study suggest that specific adverse consequences on children mental health and well-being might be traced back to family life changes that occurred during the economic crisis period, in Portugal. Changes to food practices, such as buying cheaper food, and having to resort to help for food, are particularly worrying, since such changes may lead to a poorer quality diet, in turn associated with a compromised physical and mental development. The financial constraints imposed on families by the economic crisis and reflected on changes such as having to move to more economic housing or having to use one's savings, may also represent a dramatic change to the stability each child needs for a healthy development. It is, therefore, essential, to address these early-life determinants of children mental health, and design health promotion activities that can prevent the negative consequences associated with economic crisis.

CRediT authorship contribution statement

Diogo Costa: Conceptualization, Methodology, Formal analysis, Writing - original draft. **Marina Cunha:** Writing - review & editing. **Cláudia Ferreira:** Writing - review & editing. **Augusta Gama:** . **Aristides M. Machado-Rodrigues:** Investigation, Writing - review & editing. **Vítor Rosado-Marques:** Writing - review & editing. **Helena Nogueira:** Writing - review & editing. **Maria-Raquel G. Silva:** Writing - review & editing, Writing - review & editing. **Cristina Padez:** Writing - review & editing.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.childyouth.2020.105332.

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