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O (DIS) FUNCIONAMENTO EMOCIONAL EM CRIMINOSOS PSICOPATAS E NÃO PSICOPATAS

Tese de Doutoramento em Psicologia, na especialidade de Psicologia Forense, orientada pelos Professores Doutores Rui Paixão (Universidade de Coimbra) e Fernando Barbosa (Universidade do Porto) e apresentada à Faculdade de Psicologia e de Ciências da Educação da Universidade de Coimbra.

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O (dis) funcionamento emocional em criminosos psicopatas e não psicopatas

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Tese de Doutoramento apresentada à Faculdade de Psicologia e de Ciências da Educação da Universidade de Coimbra, para obtenção do grau de Doutor em Psicologia, na especialidade de Psicologia Forense, sob orientação dos Professores Doutores Rui Paixão (Universidade de Coimbra) e Fernando Barbosa (Universidade do Porto).

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Resumo

O comportamento criminal é, muitas vezes, associado a défices na capacidade de identificar emoções em expressões faciais, apesar de a investigação evidenciar resultados contraditórios. No entanto, até ao momento, poucos estudos se focaram na possível influência de aspetos metodológicos, tais como fatores específicos das amostras ou as contingências materiais e sociais no desempenho das tarefas de identificação de emoções.

O objetivo desta tese foi o de investigar o funcionamento emocional de criminosos, tendo em consideração o estudo do nível de psicopatia e a influência de contingências materiais e sociais no processamento de emoções básicas facialmente expressas.

Para atingir o objetivo preparou-se o material-estímulo do NimStim Data Set, recolheram-se dados normativos numa amostra de grande dimensão e estudaram-se os potenciais efeitos de variáveis demográficas como a idade, o sexo e a educação na identificação de emoções em expressões faciais. Uma vez obtido o material-estímulo (261 fotografias), garantida a sua qualidade para a indução de emoções e selecionada a medida mais adequada à resposta fisiológica dos criminosos às expressões faciais realizaram-se vários estudos, nomeadamente: um estudo focalizado na identificação de expressões faciais de emoções de valência negativa através de um paradigma Go/No-go e estudos centrados na influência das expetativas da recompensa e do custo de resposta material e a influência de contingências sociais na identificação de emoções básicas facialmente expressas.

Os resultados sugerem a não existência de uma relação geral entre o comportamento criminal e um défice na identificação de emoções negativas em

expressões faciais nos indivíduos de alto nível de psicopatia. Além disso, evidenciam uma tendência comum, em psicopatas e criminosos, para falsas identificações de expressões faciais de medo e de raiva. Os resultados da influência das expetativas das contingências materiais na identificação de emoções básicas facialmente expressas sugerem que, na condição de expetativa de recompensa material, os criminosos antissociais persistentes cometem mais erros, quer ao nível intragrupo quer ao nível intergrupo, do que na condição de expetativa de custo de resposta, na qual não se distinguem dos controlos. Porém, os criminosos antissociais persistentes apresentam uma resposta fisiológica mais intensa do que os controlos na identificação de emoções em ambas as condições de contingências materiais, não se distinguindo ao nível intragrupo. No que se refere aos resultados da influência das contingências sociais na identificação de emoções básicas facialmente expressas, os criminosos antissociais persistentes não se diferenciam dos controlos no número de erros e no tempo de reação nas condições de "feedback", punição social, recompensa social e desafio social com recompensa.

Em conclusão, os dissensos na literatura, respeitantes à eventual existência e caraterísticas de disfunções na identificação de emoções em expressões faciais, em criminosos, poderão dever-se ao nível de psicopatia e às contingências materiais e sociais associadas à tarefa.

Palavras-chave: criminalidade antissocial, recompensa, custo de resposta, psicopatia, identificação de emoções.

Abstract

Criminal behavior is often associated with deficits in the ability to identify emotions in facial expressions. However, the research carried out so far has provided conflicting results. Further, few studies have focused on the possible influence of methodological aspects, such as specific factors related to the samples or the material and social contingencies associated with the tasks of identifying emotions.

The aim of this thesis was to investigate the emotional functioning of criminals while taking into account the level of psychopathy the samples exhibited and the influence of material and social contingencies in processing basic facially expressed emotions. For this purpose, the material - stimulus NimStim Data Set was prepared, normative data were collected from a large sample and the potential effects of demographic variables such as age, gender and education on the identification of emotions in facial expressions were studied. Once the material stimulus (261 photos) was obtained and their ability to induce emotions in the Portuguese population verified, the most appropriate for measuring the physiological response to facial expressions by criminals were selected. A study was then performed which focused on the identification of facial expressions of emotions with a negative valence by means of a Go/No-go paradigm. The studies concentrated on the influence of expectations of material reward or cost as well as social contingencies in the identification of basic, facially expressed emotions.

The results suggest the lack of a general relationship between criminal behavior and a deficit in identifying negative emotions in facial expressions in individuals of high psychopathy. Nevertheless, they indicate a common trend in psychopaths and criminals to falsely identify facial expressions of fear and anger. The results of the influence of the expectations of material contingencies in identifying basic facially expressed

emotions suggest that under the condition of an expectation of a material reward, persistent antisocial criminals commit more errors, both at the intra and inter-group levels, than under the condition of response cost, which do not differ from the controls. However, persistent antisocial criminals have a stronger physiological response than the controls when identifying emotions under both conditions of material contingencies, with no distinction at the intra-group level. Concerning the results of the influence of social contingencies on the identification of basic facially expressed emotions, persistent antisocial offenders did not differ from the controls regarding the number of errors or the reaction time under the conditions of: "feedback," social punishment, social reward and rewarded social challenge.

In conclusion, the contribution of this study is to suggest that the dissent in the literature concerning the existence and characteristics of dysfunctions in identifying emotions in facial expressions among criminals may be due to their level of psychopathy and the material and social contingencies associated with the task they are given to do.

Keywords: antisocial criminality, reward, cost response, psychopathy, identifying emotions.

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CAPÍTULO 8: SOCIAL CONTINGENCIES MODULATE THE ABILITY TO IDENTIFY FACIAL AFFECT: COMPARATIVE RESEARCH

LISTA DE ABREVIATURAS

BL: Baseline/ Linha de base

DSM-IV-TR: Diagnostic and Statistical Manual of Mental Disorders- fourth edition revised/ Manual de Diagnóstico e Estatístico das Perturbações Mentais – 4ª Edição

DSM-V: Diagnostic and Statistical Manual of Mental Disorders - fifth edition/ Manual de Diagnóstico e Estatístico das Perturbações Mentais – 5ª Edição

EDA: Electrodermal Activity/ Atividade eletrodérmica

ISI: Inter-stimuli interval /Intervalo interestímulos

NPC: Skin conductance level/ Nível da condutância da pele

SCR: Skin Conductance Response/Condutância da pele/Resposta eletrodérmica

Apresentação

"Todos temos por onde sermos desprezíveis. Cada um de nós traz consigo um crime feito ou o crime que a alma lhe pede para fazer."

Fernando Pessoa

O trabalho diário com criminosos exige o conhecimento, minucioso, das vidas profissionais, sociais, familiares, amorosas e religiosas destas pessoas. É neste contexto que, ao longo destes anos de trabalho, nos surgem as questões: "por que motivo comete aquela pessoa crimes?", ou "por que razão esta pessoa, bom pai, bom filho, bom irmão, bom amigo, comete crimes tão gravosos para a vida da vítima?". E se, por vezes, a envolvência social facilmente explica o que se passa, outras vezes, a questão não encontra nesse meio qualquer hipótese justificativa. Daí a ideia de que, talvez, a resposta esteja nas circunstâncias individuais do cometimento do crime. Por exemplo, na resposta à questão: "se aquela pessoa é sensível às emoções dos seus pares, por que razão, na altura do crime, não foi sensível às emoções da vítima?" Mais complicado ainda é, no entanto, quando estes comportamentos se tornam repetitivos e difíceis de entender racionalmente. Ressalvo que não estou aqui a falar de crimes ou de criminosos mediáticos, mas sim daqueles crimes e pessoas que repetidamente, sem que se perceba cabalmente a razão, se encontram nos corredores das Polícias e Tribunais.

De qualquer modo, a hipótese geral de que a existir uma diferença no processamento emocional de criminosos e não-criminosos, esta estará, pelo menos em parte, nas circunstâncias individuais do cometimento do crime, uma vez que é especialmente aí que as pessoas que não cometem crimes se distinguem dos criminosos.

Esta situação do cometimento persistente de crimes, na vida real, está muitas vezes relacionada com a expetativa de um ganho monetário, ou de um outro ganho material.

Uma outra questão, que tentaremos explorar aqui, é saber como os criminosos podem ser hábeis na manipulação das emoções dos outros, se eles próprios apresentam défices na capacidade de identificação dessas emoções nesses outros.

Considerando estas situações, tentou-se investigar em contexto laboratorial fatores individuais que podem estar relacionados com o comportamento criminal, como a expetativa de ganho e as emoções expressas pelas vítimas. No entanto, a situação laboratorial é uma aproximação rudimentar da realidade, ficando em aberto a questão da legitimidade da extrapolação dos resultados assim obtidos. Também, a utilização de medidas periféricas, como a condutância da pele, serviu para estudar, do ponto de vista psicofisiológico, as respostas emocionais destes sujeitos.

O desenrolar da investigação, particularmente os resultados que foram sendo obtidos, levou a algumas alterações do plano experimental inicial. Estas alterações tiveram como reflexo uma aproximação progressiva à realidade das situações estudadas e uma melhoria das metodologias utilizadas.

Introdução

O comportamento criminal persistente[1] é responsável por altos níveis de sofrimento na comunidade. No entanto, o comportamento criminal não aparece definido como uma Perturbação no Manual de Diagnóstico e Estatístico das Perturbações Mentais (DSM-IV-TR) (American Psychiatric Association, 2000, nem na atual DSM-V (American Psychiatric Association, 2012), embora algumas das Perturbações da Personalidade aí descritas, quando consideradas em conjunto, acabem por incluir a maioria dos criminosos (Raine, 1993). Estas Perturbações de Personalidade partilham a tendência para a perseveração, para a dificuldade em lidar com os outros e para o desvio (Hiscoke, Langstrom, Ottosson, & Grann, 2003). Partilham, ainda, uma alta comorbilidade, particularmente entre a Perturbação de Personalidade Antissocial e a Personalidade Borderline (He, Cassaday, Howard, Khalifa, & Bonardi, 2011), bem como entre estas duas, em particular a Personalidade Antissocial, e o construto de Psicopatia (Coid & Ullrich, 2010).

De facto, os criminosos persistentes, para além de evidenciarem este tipo de perturbações do eixo II (como as antes referidas), mostram também alguma heterogeneidade psicopatológica, apesar de alguns autores sublinharem a existência de um aspeto unificador do perfil psicológico destas populações, isto é, o pobre controlo dos impulsos (He et al., 2011).

No entanto, apenas uma pequena minoria dos criminosos apresenta uma predisposição intrínseca para cometer crimes, repetindo-os ao longo do tempo,

[1] Utiliza-se aqui o termo de comportamento criminal persistente, que implica o cometimento de dois ou mais crimes dolosos, e não de comportamento criminal reincidente, uma vez que segundo o Tribunal da Relação de Coimbra para que se verifique a reincidência são necessários os seguintes pressupostos: a) Formais: o cometimento de um crime doloso que deva ser punido com prisão efetiva superior a seis meses; a condenação anterior, com trânsito em julgado, de um crime doloso, em pena de prisão superior a seis meses e o não decurso de mais de 5 anos entre o crime anterior e a prática do novo crime; b) Material: que se mostre que, segundo as circunstâncias do caso, a condenação ou condenações anteriores não serviram ao agente de suficiente advertência contra o crime.
Fonte: Acórdão de 30/05/2012, acessível em http://www.trc.pt/direito-penal/7836-recpen-68101gavgsc1.html

comparativamente com os criminosos que apenas cometem um único crime (Raine, 1993). Por esse motivo, um melhor entendimento dos processos psicológicos que contribuem para a persistência destes comportamentos criminosos ajudará a preveni-los e a encontrar formas de intervenção mais eficazes junto destes criminosos persistentes. Mas, é também necessário clarificar que o comportamento antissocial, a psicopatia e a criminalidade são conceitos distintos que poderão, por vezes, ser (ou não) a dupla face de uma mesma moeda. De facto, a definição de comportamento antissocial e de conduta criminal, muitas vezes, não são coincidentes. Para a operacionalização de comportamento antissocial podemos recorrer à DSM-IV TR (American Psychiatric Association, 2000), na qual a Perturbação de Personalidade Antissocial é descrita como um comportamento antissocial marcado por um padrão perseverante de desrespeito e violação dos direitos dos outros.

Do ponto de vista teórico, o construto clínico da Psicopatia veio alargar o conceito primário e comportamental da Perturbação de Personalidade Antissocial para incluir aspetos da personalidade, particularmente do funcionamento afetivo e interpessoal (Morrissey & Hollin, 2011), inseridos como critérios de diagnóstico na recente DSM-V (American Psychiatric Association, 2012), designadamente:

> A. Significantes défices no funcionamento da personalidade manifestado por:
>
> 1. Défices no funcionamento do Eu (a ou b):
>
> a. Identidade: Egocentrismo; autoestima derivada de ganho pessoal, poder ou prazer.
>
> b. Direção do Eu: Estabelecimento de objetivos com base na gratificação pessoal: ausência de normas internas prossociais associadas à não conformidade do comportamento com a lei e com a cultura ética normativa.
>
> 2. Défices no funcionamento interpessoal (a ou b):
>
> a. Empatia: Falta de preocupação com os sentimentos, necessidades, ou sofrimento dos outros, falta de remorso depois de ferir ou maltratar o outro. b. Intimidade: Incapacidade para relacionamentos íntimos mútuos, pois o aproveitamento é a principal forma de se relacionar com os outros,

inclusivamente usando a mentira e a coação; uso de dominância ou intimidação para controlar os outros.

B. Traços de personalidade patológicos nos seguintes domínios:

1. Antagonismo caracterizado por:

a. Manipulação

b. Mentira,

c. Insensibilidade,

d. Hostilidade.

2. Desinibição, caracterizada por:

a. Irresponsabilidade.

b. Impulsividade

c. Correr riscos.

C. Os défices no funcionamento da personalidade e a expressão dos traços de personalidade são relativamente estáveis no tempo e consistentes através das situações.

D. Os défices no funcionamento da personalidade e a expressão dos traços de personalidade não são melhor compreendidos como normativos para o estado do indivíduo ou o seu ambiente sociocultural.

E. Os défices no funcionamento da personalidade e a expressão dos traços de personalidade não são somente devidos a efeitos fisiológicos direto do uso de substâncias (e.g. drogas de abuso e medicação) ou a uma condição médica geral (e.g. severo trauma craniano).

F. O indivíduo deve ter, pelo menos, 18 anos.

A doutrina jurídica, por outro lado, define a noção de crime como tendencialmente correspondente à forma mais gravosa do comportamento antissocial. A Constituição da República Portuguesa estipula que não pode haver crime sem uma lei prévia que o defina. Assim, no seu art.º 29.º, n.º 1 e 3, refere: "*ninguém pode ser sentenciado criminalmente senão em virtude de lei anterior que declare punível a acção ou a omissão, nem sofrer medida de segurança cujos pressupostos não estejam fixados em lei anterior*", e que "*não podem ser aplicadas penas ou medidas de segurança que não estejam expressamente cominadas em lei anterior"*. Desta forma cabe ao Direito Penal definir as ações que constituem crime, sendo este considerado do ponto de vista dogmático uma ação típica, ilícita, culposa e punível. Sendo certo que o Direito Penal,

ao ter como exigência prévia a definição específica dos crimes, restringe a aplicação de penas aos casos expressamente previstos nessas definições, ficando de fora as restantes condutas que constituem ilícitos de outra natureza (civil, administrativa, etc.), e cuja gravidade e rentabilidade podem ser extraordinariamente variáveis.

É sabido que uma das razões, se não mesmo a principal razão, que está na base de muitos crimes, é a obtenção de um ganho material (Baker & Piquero, 2010). Por esse motivo, podemos supor que os criminosos tenham uma sensibilidade diferente às contingências materiais da sua conduta (plausivelmente, uma maior sensibilidade aos ganhos e menor às punições).

Por sua vez, a sensibilidade à recompensa pode ser um traço de personalidade útil para distinguir tipos de ofensores criminosos de não criminosos (Leue, Brocke, & Hoyer, 2008). Alguns estudos indiciam uma hipersensibilidade à recompensa nas pessoas impulsivas, uma vez que tendem a escolher recompensas mais pequenas e imediatas em detrimento de recompensas maiores, mas desfasadas temporalmente (Martin & Potts, 2009). No mesmo sentido, estudos imagiológicos recentes mostram que as pessoas impulsivas têm uma maior ativação cerebral às recompensas (Bjork, Chen, Smith, & Hommer, 2010; Bjork, Knutson, & Hommer, 2008; Bjork, Smith, Chen, & Hommer, 2011; Buckholtz et al., 2010; Engelmann & Tamir, 2009; Hariri et al., 2006).

Outro aspeto que pode ser importante para compreender o comportamento criminal são as emoções, uma vez que constituem uma base para o estudo da forma como os indivíduos se comportam em interação.

O processamento emocional envolve a correta identificação de expressões faciais (Gray, 1987). Por esse motivo, a investigação nesta área é abundante, apesar de

se deparar, numa primeira fase, com a dificuldade de obter estímulos que sejam indicadores válidos de estados emocionais (Wallbott & Scherer, 1986).

Tem sido descrito na literatura que défices na identificação das emoções estão associados à competência social (Martens, 2003) e os erros na identificação de expressões faciais podem estar relacionados com falhas na socialização e com a etiologia do comportamento criminal (Blair, Peschardt, Budhani, Mitchell, & Pine, 2006; Dodge, Laird, Lochman, & Zelli, 2002; Howner et al., 2011; van Goozen, Fairchild, Snoek, & Harold, 2007). No mesmo sentido os modelos psicobiológicos têm vindo a propor a existência de diferenças na capacidade de identificação das emoções em expressões faciais em ofensores e não ofensores (Dolan & Fullam, 2006; Marsh & Blair, 2008).

Várias investigações têm sido conduzidas nesta área e algumas apontam para a existência de défices na identificação de expressões faciais de emoções em populações antissociais em geral, incluindo pessoas com comportamento violento, criminoso, delinquente, indivíduos genericamente com transtornos externalizantes (Marsh & Blair, 2008), reclusos (Robinson et al., 2012), pessoas com perturbações de personalidade associadas à criminalidade, como Perturbação de Personalidade Antissocial (Dawel, O'Kearney, McKone & Palermo, 2012; Dolan & Fullam, 2006; Marsh & Blair, 2008), Psicopatia (Dolan & Fullam, 2006; Hastings, Tangney, & Stuewig, 2008; Iria & Barbosa, 2009; Marsh & Blair, 2008; Wilson, Juodis, & Porter, 2011) ou Personalidade Borderline (Robin et al., 2012). No entanto, outras investigações não têm encontrado défices (Pfabigan, Alexopoulos, & Sailer, 2012), ou evidenciam resultados distintos para as diferentes emoções (Blair, Colledge, Murray, & Mitchell, 2001; Hastings et al., 2008; Stevens, Chraman, & Blair, 2001) ou, ainda, encontram resultados opostos,

evidenciando uma maior capacidade nestas populações (Book, Quinsey, & Langford, 2007).

Existe, no entanto, um maior consenso relativamente ao défice se revelar, sobretudo, nas emoções negativas. Por exemplo, uma meta-análise de 20 estudos revelou um défice específico na identificação facial do medo, tristeza e surpresa em ofensores antissociais (Marsh & Blair, 2008). Num estudo mais recente verificou-se, também, a existência de défices específicos no reconhecimento de expressões faciais de tristeza, medo, nojo e raiva em ofensores violentos e não violentos (Robinson et al., 2012).

Um importante meio, entre muitos outros, para o estudo das emoções é o registo da resposta eletrodérmica da pele no decurso de situações ou em resposta a estímulos potencialmente indutores de respostas emocionais (i.e., emocionógenos). A análise deste registo é um bom indicador da ativação psicofisiológica associada à intensidade da emoção (Lang, Bradley, & Cuthbert, 1990). A resposta eletrodérmica é, então, uma medida do sistema nervoso autónomo sob o controlo direto do sistema simpático (Dawson, Schell, & Filion, 2000), que resulta de modificações na atividade sudorípara da pele relacionadas com as rápidas flutuações da atividade das glândulas sudoríparas écrinas, devidas à libertação da acetilcolina pelo sistema nervoso simpático (Khalfa, Peretz, Blondin, & Manon, 2002). Deste modo, as respostas do sistema nervoso autónomo, particularmente a ativação medida pela resposta eletrodérmica (Blair & Cipolotti, 2000), podem fornecer índices confiáveis sobre as reações emocionais (Khalfa et al., 2002), eventualmente estimuladas e evocadas nas pessoas (como respostas emocionais) pelas expressões faciais (Marsh, Ambady, & Kleck, 2005).

De facto, uma reduzida atividade do sistema nervoso autónomo tem sido considerado um biomarcador do comportamento agressivo e antissocial (Baker, Shelton, Baibazarova, Hay, & Van Goozen, 2013). Neste caso, por exemplo, os estudos têm mostrado uma hiporresponsividade eletrodérmica em antissociais (Buikhuisen, Bontekoe, Plas-Korenhoff, & Buuren, 1984; Raine, Bihrle, Vernables, Mednick, & Pollock, 1999; Raine & Venables, 1984; Raine, Venables, & Williams, 1990; Wahlund, Sorman, Gavazzeni, Fischer, & Kristiansson, 2010). Outros estudos, no entanto, vão mais longe e sugerem que uma baixa atividade eletrodérmica prediz o comportamento criminal, lançando a tese de que poderá ser um dos fatores desencadeadores do comportamento antissocial (Kruesi et al., 1992; Raine et al., 1990).

Raine (2002) elenca as duas principais teorias explicativas da reduzida atividade do sistema nervoso autónomo da antissociabilidade e do comportamento criminal: a teoria do baixo medo e a teoria da procura da estimulação. Estas teorias podem, segundo este ponto de vista, ser consideradas complementares, na medida em que uma baixa ativação predispõe para o crime porque provoca um baixo nível de medo e encoraja o comportamento antissocial pela procura de estimulação. Uma outra explicação é a da reduzida atividade orientada na antissociabilidade. Esta teoria estaria centrada numa disfunção atencional e num défice pré-frontal.

As investigações que mostram esta reduzida ativação estão, habitualmente, relacionadas com o estudo do condicionamento do medo e processamento de estímulos relacionados com o medo (Birbaumer et al., 2005; Glenn, Raine, Venables, & Mednick, 2007; Syngelaki, Fairchild, Moore, Savage, & Van Goozen, 2013). As metodologias, no entanto, são muito diversificadas, implicando, por exemplo, a avaliação da resposta eletrodérmica de emoções facialmente expressas, evidenciando que os ofensores, com

ou sem perturbações mentais definidas (incluindo psicopatia), apresentam respostas menos pronunciadas para a emoção de medo (Seidel et al., 2013; Wahlund et al., 2010).

Porém, alguns dados contraditórios têm sido publicados em amostras de ofensores sugerindo, por exemplo, uma hiperreatividade fisiológica em ofensores que cometeram maus-tratos infantis (McCanne & Hagstrom, 1996). Estes dados são complementados com estudos imagiológicos onde os ofensores mostram um maior processamento neuronal para faces com medo na amígdala e outras áreas cerebrais comparativamente com controlos não criminosos (Howner et al., 2011). Uma possível explicação para os resultados contraditórios surge das investigações que controlam outras variáveis: neste caso, a reduzida atividade do sistema nervoso autónomo parece caracterizar apenas as classes socioeconómicas altas e não as baixas (Buikhuisen et al., 1984; Raine, Reynolds, Venables, & Mednick, 1997), bem como os criminosos sem história de lares problemáticos ou sem vivências de ausência parental (Hemming, 1981), lançando a tese da relação dos fatores psicofisiológicos com o comportamento antissocial quando o indivíduo apresenta uma história desenvolvimental mais harmoniosa, isto é, sem grandes fatores psicossociais de risco (Raine, 2005).

No entanto, os sujeitos de baixo nível socioeconómico também podem apresentar as referidas menores ativações psicofisiológicas. Mas, nesse caso é mais difícil saber-se até que ponto a antissociabilidade se deve aos fatores psicofisiológicos, dada a coexistência dos fatores sociais. Quer dizer, se um indivíduo antissocial não estiver pressionado à antissociabilidade pela vivência de situações sociais desfavoráveis, o maior contributo para o seu comportamento antissocial dever-se-á, provavelmente, à influência dos fatores biológicos (Raine, 2005).

O vasto e heterogéneo grupo dos comportamentos criminosos tem levado os investigadores a procurar outros conceitos, como o de psicopatia, de modo a diferenciar

desse vasto grupo possíveis entidade específica que permitam perceber e clarificar parte das diferenças encontradas nessas populações.

Assim, apesar de na DSM-IV TR (American Psychiatric Association, 2000) e na atual DSM-V (American Psychiatric Association, 2000) apenas existir o diagnóstico de Perturbação de Personalidade Antissocial, tem sido considerado, no contexto forense, o conceito de Psicopatia, como um caso mais específico desta Perturbação (Dolan & Fullam, 2006), por apresentar a vantagem de permitir identificar populações que partilham uma etiologia comum baseada numa disfunção específica de processamento emocional (Blair, Mitchell, & Blair, 2005).

Alguns estudos, efetivamente, têm mostrado que os psicopatas criminosos apresentam um défice geral no reconhecimento de emoções, medido através das expressões faciais (Hastings et al., 2008). No entanto, também no caso específico da psicopatia existem resultados contraditórios, pois algumas investigações apenas encontraram um défice para a identificação de expressões faciais de medo (Blair et al., 2004; Iria & Barbosa, 2009), ou de nojo (Kosson, Suchy, Mayer, & Libby, 2002); outras não encontraram qualquer défice (Glass & Newman, 2006; Book et al., 2007) e outras, ainda, reportam que os psicopatas têm um melhor desempenho no reconhecimento da raiva (Kosson et al., 2002).

A psicopatia é definida como uma perturbação da personalidade caraterizada por um conjunto específico de traços interpessoais e comportamentais (Cleckley, 1976; Hare, 1991), bem como por um défice na cognição social e no comportamento (Ritchell et al., 2005). Alguns autores têm considerado que a completa manifestação comportamental da psicopatia tem uma considerável influência social (Blair, 2008), pelo que estas influências podem discriminar os psicopatas bem-sucedidos dos mal-

sucedidos (Gao & Raine, 2010). No entanto, apesar da influência destes fatores, parece existir uma base biológica nesta estrutura da personalidade, em ambos os casos (Blair, 2008; Gao & Raine, 2010).

A dimensão antissocial da psicopatia permanece em discussão, desconhecendo-se se este comportamento é uma característica efetivamente necessária à psicopatia (Gao & Raine, 2010) ou um sintoma secundário desta perturbação (Cooke, Michie, Hart, & Clark, 2004). Também se desconhece se os psicopatas correm um maior risco de cometer crimes (Hall & Benning, 2006), não estando, deste modo, completamente estabelecida a relação entre psicopatia e comportamento criminal (Hall & Benning, 2006). Apesar disto, do ponto de vista estrito dos construtos operacionais, o comportamento antissocial tem sido considerado como parte integrante da psicopatia (Raine et al., 2005).

A presente investigação

Independentemente dos limites relativamente indefinidos e parcialmente justapostos das noções de antissociabilidade, criminalidade e psicopatia é necessário encontrar uma via que nos permita estudar as características compreensivas e explicativas do funcionamento emocional de muitos dos indivíduos que cometem crimes repetidamente.

O nosso objetivo inicial foi saber se havia um efeito específico da psicopatia no processamento emocional e de que maneira a psicopatia e o cometimento de crimes influenciavam esse processamento. Este problema foi abordado considerando a comparação dos quatro grupos seguintes: (1) criminosos persistentes com alto nível de psicopatia; (2) criminosos persistentes com baixo nível de psicopatia; (3) indivíduos sem historial de crime e com alto nível de psicopatia; (4) indivíduos sem historial de crime e com baixo nível de psicopatia. Para alcançar este objetivo propusemo-nos testar as seguintes hipóteses:

1) Os criminosos (psicopatas e não-psicopatas) apresentam défices na identificação das expressões;

2) Existem especificidades no processamento de expressões faciais negativas em criminosos psicopatas, não-criminosos psicopatas, criminosos não-psicopatas e não-criminosos não-psicopatas, esperando-se que os não criminosos psicopatas apresentem défices menores relativamente aos criminosos psicopatas e que estes apresentem défices maiores do que os criminosos não psicopatas.

No entanto, ao longo do desenvolvimento dos estudos desta tese novos critérios de diagnóstico da Perturbação de Personalidade Antissocial da DSM-V (American Psychiatric Association, 2012) foram reconhecidos. Como estes novos critérios

integram a quase totalidade dos critérios de diagnóstico da psicopatia (Strickland et al., 2013), optou-se por avaliar as amostras de criminosos persistentes com recurso à atual DSM-V. Escolheu-se esta amostra por nos parecer ser aquela em que melhor se poderá estudar algumas condições individuais, nomeadamente o processamento emocional de expressões faciais, que poderão, eventualmente, contribuir para o cometimento de crimes. De facto, a situação de cometimento de crime envolve, muitas vezes, um contacto direto entre o ofensor e a vítima e, por esse motivo, nessa interação pessoal é importante estudar as emoções e a sua consequente identificação através das expressões faciais. Por esta razão, a investigação, neste campo, tem-se debruçado sobre este problema, colocando alguma ênfase nos fatores psicobiológicos e psicossociais, e na interação entre ambos.

Porém, à situação de cometimento de crime está também subjacente o incentivo pelo qual o mesmo é praticado, mas pouco se tem investigado sobre este assunto. Assim, propusemo-nos fazer uma investigação que estudasse o processamento emocional de expressões faciais, nas dimensões de resposta cognitiva e psicofisiológica, considerando o papel das contingências materiais e sociais em participantes, não encarcerados, com um historial de crime persistente e diagnóstico de personalidade antissocial. A tarefa estudada incluiu a identificação de emoções em expressões faciais, em diferentes condições experimentais associadas a contingências sociais e expetativas de contingências materiais. Foi avaliada a percentagem de acertos, o tempo de resposta e a condutância eletrodérmica.

Pelo explicado acima, os objetivos deste estudo passaram, então, a incluir as três seguintes hipóteses:

1) Os criminosos antissociais apresentam défices na identificação de emoções facialmente expressas quando comparados com controlos da população geral;

2) As contingências materiais e sociais associadas à tarefa de identificação de expressões faciais nos diferentes grupos influencia o desempenho, prevendo-se que as contingências materiais aumentem o nível de desempenho dos criminosos antissociais persistentes enquanto as contingências sociais não interfiram no mesmo;

3) A resposta eletrodérmica (fator biológico), nas diferentes condições experimentais está relacionada com o desempenho (fator cognitivo/comportamental) em cada um dos grupos, prevendo-se uma maior ativação da resposta eletrodérmica dos criminosos antissociais persistentes nas condições de contingências materiais (associada à melhoria do desempenho) relativamente aos controlos.

Por ser necessário utilizar estímulos validados para a população portuguesa e controlar variáveis confundentes para obter conclusões fidedignas foi também objetivo deste projeto: investigar os estímulos utilizados (fotografias do NimStim - Faces Stimulus Set) na população portuguesa.

Os estudos realizados foram sequenciais e, na primeira fase foram feitos dois estudos para a validação do NimStim Data Set para a população portuguesa, com população não forense.

Depois, numa segunda fase, foram realizados seis estudos exploratórios com população forense: um estudo da resposta eletrodérmica e da temperatura cutânea da pele e um estudo da resposta eletrodérmica, ambos relativos à exposição a expressões faciais; um estudo sobre a relação da psicopatia e a capacidade de identificação das emoções negativas em criminosos persistentes e controlos; e três estudos sobre o efeito das contingências materiais e sociais na capacidade de identificar emoções facialmente expressas em amostras de criminosos antissociais persistentes e controlos.

Na sua totalidade as amostras incluíram na primeira fase 500 participantes (213 homens e 287 mulheres), com idades entre os 18 e os 78 anos, de nacionalidade portuguesa, recrutados em vários locais do centro do país. E, na segunda fase, nos estudos com população criminosa persistente, 106 criminosos persistentes e 87 participantes sem qualquer condenação. Alguns indivíduos colaboraram em vários estudos. Todos os participantes estavam não encarcerados, e foram recrutados por anúncios em associações de suporte a ex-reclusos e em associações culturais, sociais e desportivas. Os procedimentos e os instrumentos utilizados destinaram-se a avaliar o nível de psicopatia, o processamento emocional, o funcionamento psicofisiológico, o funcionamento neuropsicológico, o efeito das condições experimentais e outras possíveis variáveis confundentes. Especificamente, incluíram uma entrevista de triagem, na qual se avaliou o consumo passado e atual de álcool ou drogas e défices neurológicos e/ou patologia psiquiátrica. Utilizaram-se, ainda, os seguintes instrumentos e o seguinte paradigma:

1 PCL:SV - Checklist de doze itens, adaptada para a população portuguesa por Soeiro (2006), destinada a triar a psicopatia, podendo ser aplicada em populações clínicas e não-forenses;

2 Teste de Inteligência Abstrata. Versão curta das Matrizes Progressivas de Raven estandardizada para a população portuguesa (Amaral, 1966). Esta versão compreende cinco séries de seis itens cada. Em cada item é pedido ao participante para identificar o segmento que falta (entre 6 a 8 alternativas) para completar um padrão. Cada resposta corresponde a 1 ponto, num máximo de 30 pontos.

3. Bases de dados de fotografias/estímulos: NimStim Data Set (Tottenham et al., 2009) - inclui mais de 600 fotografias coloridas de diferentes expressões faciais de atores de ambos os sexos e diferentes "raças";

4. Fotografias selecionadas do NimStim-Pt (Iria, Paixão, & Barbosa, 2008): Foram utilizados 12 estímulos (2 fotografias de expressões faciais de cada emoção básica) em diferentes condições experimentais de identificação de emoções em diferentes condições experimentais: a. sem contingência; b. com recompensa material; c. com custo de resposta material; d. com feedback; e. com recompensa social; f. com punição social; g. com desafio social com recompensa.

5. Sistema computorizado I-330-C2 (JJ Engineering, Poulsbo, Washington) usado para o registo digital de dados psicofisiológicos;

6. Paradigma Go/No-go (Luria, 1966) - o participante responde a certos estímulos, inibindo as suas respostas a outros estímulos (distratores). Este paradigma foi aplicado a três emoções primárias negativas numa versão informatizada com estímulos emocionógeneos (expressões faciais do Nimstim).

Estrutura da tese

Este trabalho inclui uma introdução, oito capítulos, que correspondem aos estudos realizados no decurso da investigação, uma discussão dos resultados e uma conclusão.

O trabalho inicia-se com a revisão do estado da arte, focando de forma sumária a criminalidade, a psicopatia, as expressões faciais de emoções, a recompensa, a punição, a resposta eletrodérmica, estabelecendo os elos de ligação entre os temas.

Em seguida foram introduzidos os estudos empíricos realizados e que se encontram publicados, ou em processo de publicação, em diferentes revistas científicas com arbitragem científica. Por esse motivo a estrutura e apresentação desses estudos varia de acordo com os requisitos de cada revista científica.

Os primeiros dois capítulos correspondem a dois estudos de aplicação do NimStim Data Set à população portuguesa. No primeiro realizou-se uma comparação entre os resultados obtidos na população portuguesa e o estudo original (com sujeitos americanos), tendo sido possível, desta forma, eliminar alguns estímulos que se mostraram menos válidos para a população portuguesa. O segundo estudo (segundo capítulo) focou-se na seleção das fotografias/estímulos a serem utilizadas nos estudos subsequentes com a população forense. Neste caso, os estímulos foram estudados considerando as taxas de acerto, de acordo com as variáveis sociodemográficas sexo, idade e habilitações.

Os terceiro e quarto capítulos correspondem a dois estudos exploratórios e que serviram para orientar a investigação e o tratamento dos dados: no terceiro capítulo, analisa-se a resposta da condutância da pele e da temperatura cutânea de psicopatas criminosos e de não-psicopatas criminosos, perante expressões faciais de diferentes

emoções. No quarto estudo apenas se utilizou a resposta eletrodérmica, comparando-se esta medida em criminosos antissociais em geral e controlos da comunidade.

No quinto capítulo investigou-se o processamento de emoções negativas (tristeza, medo e raiva), mediante a aplicação do paradigma Go/No-Go, com os estímulos emocionais (fotografias do NimStim Data Set) antes estudados. A amostra incluiu um grupo forense dividido pelo nível de psicopatia, e um grupo de controlo também dividido pelo nível de psicopatia, perfazendo quatro grupos. Este estudo incluiu: a análise dos resultados para cada uma das emoções negativas; a análise do número de erros por omissão; e a análise do número de erros por falsos-alarmes. Finalmente, foram consideradas as relações entre o comportamento criminal, a psicopatia e a capacidade de reconhecer as emoções através das expressões faciais.

No sexto capítulo apresenta-se a avaliação da influência das contingências materiais no desempenho de criminosos em tarefas de reconhecimento de emoções através de expressões faciais do NimStim Data Set (previamente selecionadas) através do número de erros cometidos e tempo de reação. No sétimo capítulo, descreve-se uma investigação semelhante à do capítulo anterior, mas onde se incluem as medidas cognitivas e comportamentais (o tempo de reação e o número de erros) e a magnitude da Resposta eletrodérmica (SCR), utilizada para avaliar a vertente fisiológica da resposta emocional e verificar a sua concordância com as respostas comportamentais observadas. O capítulo oitavo integra o estudo sobre a influência das contingências sociais no desempenho dos sujeitos em tarefas de identificação de expressões faciais de criminosos persistentes e controlos, através das medidas de número de erros e tempo de reação.

Na discussão geral analisam-se de forma global e integrada os vários resultados, procurando-se clarificar as suas implicações. São enunciadas as principais conclusões

do estudo e são, ainda, descritas as limitações dos estudos, sugerindo-se novas investigações que permitam chegar mais longe na clarificação do processamento emocional em criminosos.

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CAPÍTULO 1

AVALIAÇÃO NEUROPSICOLÓGICA DAS EMOÇÕES NO CONTEXTO DA SAÚDE: CONTRIBUTO DO NIMSTIM–PT[2]

[2] Publicado na Revista Psicologia Saúde & Doenças, 2008, 9 (S1), 9 – 10.

Resumo

No contexto da saúde, o psicólogo depara-se frequentemente com perturbações na capacidade de descodificar informação emocional nas "pistas" do meio ecossocial. Em particular, escasseiam instrumentos para avaliação de pessoas com défices no reconhecimento de emoções nas expressões faciais. Ademais, desconhecem-se instrumentos normalizados e adaptados ao nosso meio sociocultural.

Este trabalho visou estudar as qualidades psicométricas no NimStim aplicado à população portuguesa, instrumento neuropsicológico composto por mais de 600 fotografias, no qual diferentes indivíduos expressam diferentes emoções.

O instrumento foi informatizado e administrado a uma amostra de 500 indivíduos (Homens = 213, Mulheres = 287), com idades dos 18 aos 78 anos (*M* = 36,94 anos; *d.p.* = 13,306) e habilitações académicas muito variadas (*M* = 10,29 anos de escolaridade; *d.p.* = 3,818, Min = 2; Max = 19), residentes em meio urbano e rural (urbano = 278, rural = 222). Cada participante foi convidado a classificar cada expressão facial num conjunto de oito emoções, segundo um paradigma de tempo de exposição e de resposta livre.

Obtiveram-se os primeiros dados normativos do NimStim para a população portuguesa, tendo-se apurado a percentagem de acertos e o tempo de reação por imagem, em função das faixas etárias e do sexo.

Para adaptação do NimStim à população portuguesa mostrou-se necessária uma reclassificação e reorganização das imagens a que se chamou NimStim–Pt. Deste trabalho parece ter resultado um instrumento útil para a avaliação clínica da capacidade de descodificação de emoções através de expressões faciais.

Palavras-chave: adultos, clínica, desenvolvimento de instrumentos de avaliação, avaliação neuropsicológica.

Abstract

In the context of health, the psychologist often faced with impaired ability to decode emotional information in the "clues" middle ecosocial. In particular scarce evaluation tools for people with deficits in recognizing emotions in facial expressions. Moreover, are unknown standardized tools and adapted to our socio-cultural environment.

This paper evaluates the psychometric qualities in NimStim applied to the Portuguese population, neuropsychological instrument consists of over 600 photographs, in which different individuals express different emotions.

The instrument was computerized and administered to a sample of 500 individuals (men = 213, women = 287) aged 18 to 78 years (*M* = 36.94 years, *SD* = 13.306) and very varied academic qualifications (*M* = 10 29 years of schooling, *SD* = 3.818, Min = 2, Max = 19), living in urban and rural (urban = 278, rural = 222). Each participant was asked to rate each facial expression in a set of eight emotions, according to a paradigm of exposure time and free response.

We obtained the first normative data for the NimStim Portuguese population, having calculated the percentage of correct responses and reaction time per image, depending on age and gender.

To adapt NimStim the Portuguese population showed a need for a reclassification and reorganization of the pictures he called NimStim-Pt. This work seems to have resulted in a useful tool for the clinical evaluation of the ability to decode emotions through facial expressions.

Keywords: adults, clinical development of assessment tools, neuropsychological assessment.

1. Introdução

O estudo do reconhecimento das expressões faciais está sob o escrutínio da investigação científica desde as experiências de Izard (1968) e Ekman (1972), onde se verifica a capacidade humana de reconhecimento das expressões faciais nas mais diferentes culturas. As faces constituem-se, assim, provavelmente, como os estímulos mais importantes na interação social (Posamentier & Abdi, 2003).

O reconhecimento emocional de expressões faciais assenta em vários processos psicológicos com substrato em várias estruturas neuronais (Adolphs, 2002). Os estudos indiciam que o processamento de faces constrói-se no córtice occipital e temporal, que criam as representações das características faciais, e num conjunto de estruturas, incluindo a amígdala e o córtice órbito-frontal, que ligam a representação percetiva da face com a criação das emoções assinaladas (Adolphs, 2002).

Uma das maiores dificuldades da investigação nesta área prende-se com a obtenção de estímulos que representem expressões faciais suscetíveis de serem tomadas como indicadores válidos de estados emocionais (Wallbott & Scherer, 1986). Por existirem objeções éticas à indução de estados emocionais, muitos investigadores têm recorrido a expressões faciais de atores profissionais, que exprimem diferentes emoções, reduzindo o risco de tais expressões não serem suficientemente naturais para avaliar o que se pretende – é neste contexto que surge o NimStim[3].

O NimStim é composto por cerca de 650 fotos "tipo passe", visando avaliar a capacidade de identificação e discriminação de emoções através das expressões faciais,

[3] O desenvolvimento do *MacBrain Face Stimulus Set* foi supervisionado por Nim Tottenham sob patrocínio da *John D. and Catherine T. MacArthur Foundation Research Network on Early Experience and Brain Development*. Contactar Nim Tottenham em tott0006@tc.umn.edu para mais informação sobre os estímulos.

tomando a especificidade de cada uma das emoções básicas: alegria, nojo, tristeza, raiva, medo e surpresa, além da calma e de faces neutras. Para a construção do NimStim, numa primeira fase, foi selecionado um conjunto de atores de ambos os sexos, euro-americanos, latino-americanos, afro-americanos e ásio-americanos, que receberam o *Master* em Drama no *NYUπs Tisch Program*. A estes atores foi pedido que executassem cada expressão facial e os músculos foram ajustados até se conseguirem as expressões emocionais pretendidas para que fossem fotografadas (câmara Nikon F3 35-mm), digitalizadas e transformadas em imagens computorizadas (8-bit color, 800 × 600 pixel resolução). Em seguida, foi solicitado a 80 adultos americanos que classificassem as fotografias, previamente aleatorizadas e sem limitação temporal, tendo-se analisado os resultados em termos de percentagem de acerto.

O estudo aqui apresentado confronta os resultados nacionais com os da validação original.

2. Método

2.1 Participantes

A recolha de dados com vista à validação do NimStim e normalização dos seus resultados foi conduzida junto de uma amostra de 500 indivíduos ao longo dos anos de 2006 e 2007. Avaliaram-se participantes dos dois sexos (Homens = 213, Mulheres = 287), com idades compreendidas entre os 18 e os 78 anos (*M* = 36,94 anos; *d.p.* = 13,306) e habilitações académicas muito variadas (*M* = 10,29 anos de escolaridade vertical; *d.p.* = 3,818, Min = 2; Max = 19), residentes em meio urbano e rural (urbano = 278, rural = 222).

2.2 Materiais

Foi utilizada uma versão abreviada do NimStim original composta pelas 515 imagens que no estudo inicial obtiveram mais de 50% de acertos. Estas imagens são de indivíduos de ambos os sexos (18 mulheres e 14 homens), expressando as seis emoções básicas (alegria, tristeza, raiva, medo, nojo, surpresa), bem como a calma e faces neutras. As imagens foram apresentadas a cores inseridas num fundo branco.

2.3 Procedimentos

2.3.1 Tradução e reflexão falada

A designação das emoções foi traduzida para português e, em seguida, o instrumento foi administrado a um grupo heterogéneo de 20 pessoas, de modo a verificar a clareza e o significado dos termos adotados para os adultos portugueses, bem como a compreensibilidade das instruções e a adequação do método de resposta. Na sequência da reflexão falada, os sujeitos propuseram algumas melhorias no método de resposta e na designação de algumas emoções. Assim, optou-se por nomear as emoções, em detrimento dos adjetivos que caracterizam quem as sente, tendo-se, no final, optado por exibir as seguintes possibilidades de resposta: tristeza, raiva, medo, alegria, surpresa, nojo, calma, neutro e outro.

2.3.2 Recolha de dados

As imagens foram previamente informatizadas e aleatorizadas com recurso ao Superlab versão 4, sendo mostradas aos participantes uma-a-uma, sem limite de tempo,

num ecrã de 15 polegadas. Para garantir a atenção e evitar a interferência de outros estímulos foi dada a instrução aos participantes para premir, o mais rapidamente possível, a tecla onde estivesse escrita a emoção correspondente à expressa na fotografia. Para além das 6 emoções básicas, o participante dispunha de uma tecla para a "calma", outra para o "neutro" e ainda a opção "outra", totalizando 9 possibilidades de resposta. Após a resposta era apresentada a fotografia seguinte, sem intervalo interestímulos (ISI) e sem que os participantes recebessem *feedback* sobre a correção ou incorreção das respostas emitidas.

3. Resultados

Para cada imagem calculou-se a percentagem de acerto na emoção representada, bem como a média do número de respostas por tipo (ou seja, divisão do número total de respostas pelas nove opções possíveis) e respetivos desvios-padrão.

Para inclusão dos estímulos no NimStim-Pt foram utilizados dois critérios, cumulativamente: a localização acima do ponto de corte e uma percentagem de acerto superior a 50%. A opção por estes critérios baseou-se, no primeiro caso, na assunção de que os resultados seguem a distribuição da curva normal (Hays, 1963). Para cada imagem, o ponto de corte corresponde à soma da média das respostas nas nove categorias de resposta com os respetivos desvios-padrão; depois, para representar cada emoção, apenas se aceitaram as imagens cujo número de respostas nessa categoria emocional se situava acima do ponto de corte estabelecido. O segundo critério foi escolhido de forma a excluir do NimStim – Pt quaisquer imagens cuja percentagem de acerto estivesse acima do ponto de corte em mais do que uma categoria emocional.

Na sua versão final, o NimStim-Pt ficou constituído por 333 estímulos, sendo 329 deles expressões faciais de emoções básicas, designadamente 63 de raiva, 120 de alegria, 57 de nojo, 14 de medo, 40 de surpresa, 35 de tristeza, e ainda 4 estímulos de calma (ver Quadro 1).

Compararam-se para os estímulos selecionados que integraram o NimStim-Pt as percentagens de acerto das diferentes emoções na aplicação portuguesa com as resultantes do estudo original, verificando-se que as da população portuguesa são inferiores em todas as emoções primárias e idênticas às originais no caso da calma (ver Quadro 1).

Quadro 1
Comparação entre as percentagens de acerto obtidas na população portuguesa e americana

Emoções	Nº imagens	% ac. PT	% ac. original	PT-original (% ac.)	Imagens
Raiva	63	76,15%	91,39%	-15,23%	melhor = 25m_an_o(92,60%), pior = 06f_an_o(50,50%)
Nojo	57	64,67%	90,37%	-25,70%	melhor = 42m_di_c(89,80%), pior = 35m_di_o(55,10%)
Medo	14	57,51%	83,20%	-25,70%	melhor = 43m_fe_c(69,30%), pior = 07f_fe_c(50,90%)
Tristeza	35	63,23%	87,92%	-24,69%	melhor = 13f_sa_c(79,40%), pior = 36m_sa_o(50,30%)
Surpresa	40	76,01%	81,05%	-5,04%	melhor = 11f_sp_o(86,20%), pior = 41m_sp_o(53,60%)
Alegria	120	83,19%	91,67%	-8,48%	melhor = 23m_ha_x(94,60%), pior = 31m_ha_c(51,10%)
Calma	4	59,60%	59,37%	0,23%	melhor = 18f_ca_c(65,30%), piores = 16f_sa_c; 23m_ca_c(57,30%)
Total	333				

4. Discussão

O NimStim-Pt é uma medida rápida da capacidade de identificação de emoções através de expressões faciais. É um teste não-verbal, de aplicação individual ou coletiva.

Apresenta várias vantagens, comparativamente com outros testes idênticos, porque ao não exigir a verbalização das respostas pode ser aplicado a sujeitos com perturbações graves ao nível da linguagem e/ou ao nível motor e é constituído por fotografias coloridas, semelhantes aos estímulos da vida real (Glass & Newman, 2006). Para além disso, inclui um variado número de modelos de diferentes grupos étnicos (Glass & Newman, 2006).

As variações obtidas na percentagem de acerto das emoções entre os resultados da população portuguesa e do estudo original assemelham-se às encontradas por Ekman e colaboradores (1987), compreendidas entre 16 e 29 pontos percentuais. Assim, por um lado, estas variações reforçam a tese da universalidade do reconhecimento de emoções básicas através de expressões faciais e, por outro, a necessidade de adaptação cultural dos estímulos.

Uma das limitações do NimStim-Pt prende-se com o facto de não integrar faces neutras. No entanto, ainda prossegue, atualmente, o tratamento de outros dados, como o tempo de reação, o cálculo dos restantes índices estatísticos de validade, sensibilidade e fidelidade e a validação do NimStim para a população forense e população clínica portuguesa.

Os resultados permitem-nos concluir que o estudo das propriedades psicométricas do NimStim, aplicado à população portuguesa, se reveste de grande importância, uma vez que permitiu já a sua reorganização, eliminando-se um grande número de fotografias que, por não medirem convenientemente a emoção pretendida, prejudicariam a validade do NimStim-Pt na avaliação e na investigação psicológica das emoções.

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CAPÍTULO 2

RECOGNITION OF EMOTIONS IN FACIAL EXPRESSIONS USING NIMSTIM DATA SET: INFLUENCE OF GENDER, AGE AND EDUCATION [4]

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Resumo

O objetivo deste estudo é investigar se a capacidade de identificar as expressões faciais de emoções primárias (tristeza, raiva, medo, nojo, surpresa e felicidade) é influenciada pelo sexo, idade e número de anos de educação. Usando 261 estímulos a partir do NimStim Data Set em 496 adultos inexperientes verifica-se que a idade e os anos de escolaridade dos participantes influenciam o reconhecimento de tristeza, raiva, medo e nojo. Com o envelhecimento, a capacidade de identificar emoções negativas (tristeza, raiva, medo e desgosto) tende a diminuir. O aumento da escolaridade, por outro lado, leva a uma melhor identificação dessas expressões faciais negativas e também um aumento da identificação de surpresa. A tristeza é a única emoção cuja identificação é melhor predita pelo sexo feminino. A alegria é a única emoção que não parece ser influenciada por nenhuma das variáveis sociodemográficas estudadas. Estes resultados lançam alguma luz sobre a influência das variáveis sociodemográficas na capacidade de identificação de emoções básicas expressas facialmente.

Palavras-chave: NimStim, sexo, idade, educação, reconhecimento de expressão facial.

Abstract

The aim of this study is to investigate whether the ability to identify the basic, facially expressed emotions of (sadness, anger, fear, disgust, surprise and happiness) is influenced by gender, age, and the number of years of education.

Using 261 stimuli from the NimStim Data Set on 496 untrained adults, we found that the participants' age and years of education predict the recognition of sadness, anger, fear and disgust. With ageing, the ability to identify negative emotions (sadness, anger, fear and disgust) tends to decrease, while an increase in schooling predicts a better identification of those facial expressions and also an increased identification of surprise. Sadness is the only emotion whose identification is better predicted by gender, with women showing a better performance. Happiness is the only emotion that does not seem to be influenced by any of the socio-demographic variables studied.

These results shed some light on the influence of socio-demographic variables on a person's ability to identify basic facially expressed emotions.

Keywords: NimStim, gender, age, education, facial expression recognition.

Introduction

In everyday life, facial expressions are constantly observed and identified. It has been reported that, to have a communicative function, facially expressed emotions must reflect emotional responsiveness and be correctly recognized by others (Thunberg, 2007). This is the reason why the identification of facial expressions of emotion is a prerequisite for successful social interaction (Derntl, Kryspin-Exner, Fernbach, Moser, & Habel, 2008) and thus one of the most studied aspects in psychology. Also, studying the ability to identify facial expressions of emotion allows a better understanding of various disorders in witch dysfunctions in this ability have been reported, for example, in Schizophrenia (Mandal, Pandey, & Prasad, 1998; Trémeau, 2006), Autism (Golarai, Grill-Spector, & Reiss, 2006), Depression and Bipolar Disorder (Kohler, Hoffman, Eastman, Healey, & Moberg, 2011), ADHD (Pelc, Kornreich, Foisy, & Dan, 2006), Substance Abuse and Dependence Disorders (Kornreich et al., 2010; Serrano, Lozano, Garcia, & Garcia, 2010), and Antisocial Personality Disorder (Marsh & Blair, 2008).

Also, it is important to know if the contradictory results in various conditions (e.g. Squizophrenia (Mandal et al., 1998; Sachs, Steger-Wuchse, Kryspin-Exner, Gur, & Katschnig, 2004; Trémeau, 2006), Parkinson's disease. (Buxton, MacDonald, & Tippett, 2013; Dujardin et al., 2004; Pell & Leonard, 2003), Psychopathy (Blair, Colledge, Murray, & Mitchell 2001; Blair et al., 2004; Glass & Newman, 2006; Kosson, Suchy, Mayer, & Libby, 2002), Autism (Humphreys, Minshew, Leonard, & Behrmann, 2007; Lacroix, Guidetti, Rogéb, & Reilly, 2009) could be due to the influence of others variables. Also, knowing how healthy individuals identify facial affect could help in other research on emotions and provide data for cross-cultural studies. It can also be usefull for clinical practice, namely by providing means to assess deficits in clinical

groups such as the ones above, as well as means to evaluate the effects of therapy, or the evolution of the diseases. For the correct use of data referring to healthy subjects in research or clinical settings, it is necessary to determinate the influence of certain variables on the ability to recognize facial emotions and use instrument previously traduced and adapt to the population in use (Hambleton, 1994).

It has been reported that several individual factors can affect performance in emotion identification tasks, going from hormone concentration (Derntl et al., 2008; Pearson & Lewis, 2005), to the ethnical background (Elfenbein & Ambady, 2002; Moriguchi et al., 2005; Thibault, Bourgeois, & Hess, 2006), gender (Güntekin & Başar, 2007; Hoffmann, Kessler, Eppel, Rukavina, & Traue, 2010), age (Orgeta, 2010; Suzuki, Hoshino, Shigemasu, & Kawamura, 2007), and the years of education (Kirouac & Dore, 1985). In this study we decided to explore the influence of three of such factors - gender, age, and the years of education - because they can be of interest for other research and clinical practice.

Concerning the influence of gender, a previous meta-analysis revealed that 80% of studies show an advantage for females, even if relatively small (Hall, 1984), but the subsequent empirical literature is inconsistent, and the issue of gender differences in the identification of emotions is still a topic of debate. Some studies have showed that women recognize facially expressed emotions better than men (Bigun, Choy, & Olsson, 2001; Hall & Matsumoto, 2004; Hampson, van Anders, & Mullin, 2006). On the contrary, other studies have showed either no differences (Grimshaw, Bulman-Fleming, & Ngo, 2004; Kessler et al., 2005; Vassallo, Cooper, & Douglas, 2009) or a gender effect only for certain emotions. For example, some studies suggest that women are better at recognizing facial expressions of sadness (Mandal & Palchoudhury, 1985) and

fear (Nowicki & Hartigan, 1988), while others suggest that men are superior at identifying expressions of anger (Mandal & Palchoudhury, 1985; Rotter & Rotter, 1988; Wagner, MacDonald, & Manstead, 1986). Also, women seem to consider both the emotional intensity and valence of the facial expressions whereas men only look at the valence (Thayer & Johnsen, 2000). Perhaps for this reason, previous research suggests that women are more accurate than men in recognizing subtle displays of emotion, while no gender differences were found when recognizing emotions in highly expressive faces (Hoffmann et al., 2010).

The explanations for a superior women ability to decoding emotion are several since genders stereotype (Plant, Hyde, Keltner, & Devine, 2000), to evolucionary theories based in women as universal caretakers (Babchuck, Hames, & Thompson, 1985) and gender differences in the activation of neuronal structures involved in facial affect identification, as suggested by a recent meta-analysis of fMRI studies (Fusar-Poli et al., 2009) witch reports that male have a increased activation of limbic and prefrontal areas while female show higher activation in the right subcallosal gyrus during the identification of facial affect.

Summing up the findings on gender effects, it is generally accepted the that women are more efficient in processing facial affect (Del-Ben & Graeff, 2010), but sex differences are not robust, seem to depend on specific emotion (Grimshaw et al., 2004) and existing data do not allow to establish a specific pattern for each gender (Del-Ben & Graeff, 2010).

With respect to the influence of age on the identification of facial emotions, the data published are also controversial. Moreno, Borod, Welkowitz and Alpert (1993) found no overall effect of age on identifying emotions from faces. However, when

different emotional categories were examined, a significant age-related decline became clear in the recognition of negative emotions (Mill, Allik, Realu, & Valk, 2009), namely sadness (Mill et al., 2009; Richter, Dietzel, & Kunzmann, 2011; Suzuki et al., 2007; West et al., 2012), anger (MacPherson, Phillips, & Della, 2002; Mill et al, 2009; Phillips, MacLean, & Allen, 2002; Richter et al., 2011; West et al., 2012;) and fear (Calder et al., 2003; West et al., 2012). For the recognition of disgust, both age-related decline (Sullivan & Ruffman, 2004) and improvement were observed (Suzuki et al., 2007).

As far as education is concerned, studies focusing on the effect of this factor on the identification of facial expressions are even scarcer. In general, these studies were performed recruiting participants among undergraduates (Izard, 1971; Kirouac & Dore, 1982*)*. A study by Kirouac and Dore (1985) involving high school and college participants found no relevant effect of education, but another study found that education is a significant predictor of the recognition of neutral, contempt, happiness, sadness, and surprise faces (Mill et al., 2009). In a very recent study by Trauffer, Widden, and Russel (2013) no main effect was found for educational level, but it was found an interaction education and facial expressions with less literate participants labeling sadness and anger more accurately, while participants with higher education show better results for fear and disgust.

Therefore, this study investigated the influence of gender, age and education on the emotional identification of facial expressions using the NimStim data set (Tottenham et al., 2009), in order to further clarify the importance of these variables in this social skill. Based on the literature outlined above, three hypotheses were formulated: (1) women show greater ability to identify emotions in facial expressions; (2) this ability decreases with age; (3) there is no effect of the educational level.

Materials and Methods

Participants

Five hundred Caucasian participants, 18 or more years old were recruited for this study by advertising. There was no compensation for the participation. Psychiatric or neurological disorders, cognitive deficits or sensorial impairments that could interfere with the results were criteria for exclusion. Four participants were screened out in the preliminary interview, in which the consent form was signed, due to those participants fulfilling the previously mentioned exclusion criteria. Of the remaining 496 participants, 212 were male and 284 female. Mean and standard deviation for age and years of education by gender are displayed in Table 1.

Table 1
Mean (M) and standard deviation (SD) for age and number of years of education by gender and for the total sample

Gender	Age	Number of years of education
	Mean (SD)	*Mean (SD)*
Male	37.71 (13.86)	10.10 (3.56)
Female	36.13 (12.75)	10.46 (4.10)
Total	36.92 (13.31)	10.28 (3.83)

The participant's distribution by age and years of education is presented in Table 2. Similarly to the division made by others (Okamoto et al., 2010), youth are defined as participants with their age below 20 years old, young adults are defined as participants between 20 and 39 years old, middle-aged adults, as participants between 40 and 65

years old, and aged with an age of above 65 years old. Within each age group the number of male and female participants is also stated in Table 2.

Table 2
Participant's distribution by age, gender and number of years of education

Years of education	Age 18-19	Age 20-39	Age 40-65	Age >65	Total
< 6 years	0 (0M/0F)	7 (4M/3F)	59 (21M/38F)	6 (2M/4F)	72 (27M/45F)
6-9 years	2 (1M/1F)	25 (12M/13F)	27 (14M/13F)	0 (0M/0F)	54 (27M/27F)
10-12 years	24 (13M/11F)	67 (29M/38F)	64 (32M/32F)	1 (1M/0F)	156 (75M/81F)
>12 years	31 (12M/19F)	147 (51M/96F)	36 (20M/16F)	0 (0M/0F)	214 (83M/131F)
Total	57 (26M/31F)	246 (96M/150F)	186 (87/99)	7 (3M/4F)	496 (212M/284F)

M - Male; F - Female

Materials and Procedure

The original NimStim data set is a battery of 672 stimuli, of which 646 were available to the scientific community at the time of this research. These stimuli are naturally posed color photographs on a white background, similar to facial portraits, in which trained actors, exhibit basic emotions through their facial expressions (Tottenham et al., 2009). In this study, we used a shortened version of the original NimStim study (Tottenham et al., 2009). This version comprises only the 515 pictures that achieved more than 50% of correct answers in the original study. From these 515 pictures, 254 photographs were eliminated during the experimental procedure (as explained below). Only the remaining 261 pictures (cf. the complete list of the selected photographs at the end of the paper) were used in the statistical analysis on the influence of gender, age and education on the identification of facial expressions. In the photographs selected, 24 male and 18 female actors with an age of between 21-30 years old, are expressing six

basic emotions: sadness (28), anger (47), fear (13), disgust (54), surprise (33) and happiness (86).

Procedure

A preliminary study of NimStim data set was performed in order to be applied to Portuguese individuals suitably. This preliminary study aimed at ensuring the meaning and accuracy of the words referring to the emotions that were chosen for the Portuguese answering system, and also to ensure the validity and reliability of the stimuli to be applied in our research.

Firstly, the above mentioned selected set of photographs (515) was previously shown to a heterogeneous group of 20 participants, who were questioned on the emotional labels. After debriefing the participants, it was decided to name the emotions, instead of using the adjectives referring to those who feel them. The Portuguese names given to the emotions were *tristeza* (sadness), *raiva* (anger), *medo* (fear), *nojo* (disgust), *surpresa* (surprise) and *felicidade* (happiness). Neutral, calm and other stimuli were named as *neutro*, *calma* and *outro*.

Secondly, the 496 selected participants, in individual sessions, were instructed to identify the emotions that were expressed in each photograph, by pressing the correspondent label on a keypad as fast as possible (so as to maintain their attention and decrease cognitive interference). Participants were sitting 50 cm in front of a 15-inch laptop screen where the 515 photographs were randomly displayed, one-by-one, without any kind of feedback or inter-stimuli interval. The stimuli were sequentially presented via Superlab 4.0 (2006, Cedrus corp., San Pedro, USA), advancing after the participant's response on the keypad. The original forced-choice model was applied, allowing nine possible answers ("*tristeza*", "*raiva*", "*medo*", "*nojo*", "*surpresa*",

"*felicidade*", "*neutro*", "*calma*" and "*outro*"). There was no time limit and the total experiment took from 30 min, to a maximum of 90 min without interval, depending on the participants' pace. Participants' responses to each picture were rated as correct or incorrect, depending on the agreement with the emotion being expressed and only the pictures of the six basic emotions (sadness, anger, fear, disgust, surprise and happiness) obtaining more than 50% of correct responses were kept for the study. Using this criterion, 197 photographs were eliminated.

The accuracy rates of the remaining 318 NimStim photographs were used to estimate Validity and Reliability indexes. Items that did not achieve an Item-Total Correlation of .40 were excluded, even if no improvements in Alpha values were obtained, except for fear where the exclusion value was lowered to .30 to maintain a reasonable number of photographs (Gliem & Gliem, 2003). Using this methodology, 57 photographs were further excluded, whereas the remaining 261 had proved to be the most valid and reliable. The number of items selected for each emotional category and the respective validity and reliability indexes are shown in Table 3.

Table 3
Validity and reliability indexes for each category of emotional expression (N = 496)

	Number of items selected	Accuracy Rates *M (SD)*	Correlation inter-items	Alpha
Sadness	28	.65 (.26)	.56	.92
Anger	47	.80 (.21)	.66	.95
Fear	13	.58 (.26)	.52	.79
Disgust	54	.64 (.31)	.54	.98
Surprise	33	.79 (.23)	.67	.93
Happiness	86	.86 (.18)	.76	.99
Total	261	.76 (.23)	.65	.96

N, Number of participants; *M(SD)*, Mean (Standard Deviation)

Data analysis

Multiple regression analysis using the simultaneous entry method, was used to develop a model predicting the importance of the sociodemographic variables of interest (gender, age and number of years of education) on the ability of the participants to identify the basic emotions. This methodology allowed us to overcome the differences among the number of pictures depicting each emotion, and the imbalance of the pictures chosen concerning the gender of the poser. The interaction effects were also included in the model, using centering methodology to reduce multicollinearity. Although not a primary objective of this study, simple regression was also used to explore the influence of the actor's gender on the ability to identify the basic emotions. Regressions were conducted using Statistica V8 (2007, StatSoft Inc., Tulsa, USA) software, and dummy codes were used for gender.

Results

Accuracy rates (mean and standard deviation) were calculated for each emotional category (sadness, anger, fear, disgust, surprise, and happiness) considering gender, age and educational groups (Table 4). These descriptive statistics are provided here as they may be useful as normative data for other studies.

Table 4

Mean (M) accuracy rates and standard deviation (SD) for each emotional category considering gender, age, and number of years of education.

		Sadness		Anger		Fear		Disgust		Surprise		Happiness	
Age	Number of years of education	Gender		Gender		Gender		Gender		Gender		Gender	
		M *M (SD)*	*F* *M (SD)*	*M* *M (SD)*	*F* *M (SD)*	*M* *M (SD)*	*F* *M (SD)*	*M* *M (SD)*	*F* *M (SD)*	*M* *M (SD)*	*F* *M (SD)*	*M* *M (SD)*	*F* *M (SD)*
18 to 20	< 6 *n*=0M+0F												
	[6-9] *n*=1M+1F	.82 (0.00)	1.00 (0.00)	.94 (0.00)	1.00 (0.00)	.69 (0.00)	.92 (0.00)	0.00 (0.00)	.96 (0.00)	.82 (0.00)	.91 (0.00)	.91 (0.00)	1.00 (0.00)
	[10-12] *n*=13M+11F	.60 (.28)	.69 (.34)	.74 (.20)	.76 (.18)	.59 (.25)	.55 (.27)	.64 (.36)	.77 (.30)	.80 (.21)	.77 (.22)	.80 (.22)	.89 (.13)
	> 12 *n*=12M+19F	.61 (.35)	.84 (.18)	.71 (.35)	.82 (.13)	.65 (.31)	.70 (.19)	.70 (.39)	.82 (.21)	.72 (.32)	.83 (.20)	.71 (.33)	.86 (.13)
21 to 39	< 6 *n*=4M/3F)	.69 (.15)	.52 (.32)	.90 (.08)	.71 (.25)	.67 (.17)	.23 (.27)	.85 (.19)	.13 (.09)	.90 (.06)	.63 (.21)	.95 (.09)	.84 (.13)
	[6-9)] *n*=12M/13F	.66 (.23)	.55 (.30)	.85 (.23)	.68 (.31)	.53 (.23)	.43 (.21)	.42 (.35)	.58 (.35)	.83 (.21)	.66 (.32)	.85 (.19)	.75 (.25)
	10-12 *n*=29M/38F	.69 (.24)	.72 (.26)	.84 (.19)	.87 (.19)	.64 (.23)	.63 (.25)	.66 (.32)	.68 (.31)	.84 (.20)	.86 (.16)	.89 (.14)	.87 (.15)
	> 12 *n*=51M/96F	.73 (.24)	.78 (.20)	.83 (.19)	.86 (.17)	.60 (.25)	.69 (.23)	.78 (.25)	.76 (.25)	.84 (.20)	.83 (.21)	.85 (.19)	.87 (.18)
40 to 65	< 6 *n*=21M/38F	.41 (.25)	.49 (.27)	.74 (.22)	.71 (.24)	.56 (.27)	.45 (.27)	.42 (.30)	.45 (.32)	.76 (.21)	.57 (.31)	.85 (.22)	.84 (.19)
	[6-9] *n*=14M/13F	.57 (.27)	.56 (.27)	.81 (.16)	.78 (.21)	.56 (.31)	.37 (.25)	.57 (.29)	.46 (.29)	.80 (.21)	.72 (.28)	.89 (.11)	.89 (.11)
	[10-12] *n*=32M/32F	.55 (.25)	.57 (.21)	.75 (.22)	.80 (.16)	.52 (.23)	.59 (.27)	.48 (.29)	.59 (.30)	.74 (.20)	.84 (.14)	.86 (.16)	.88 (.11)
	> 12 *n*=20M/16F	.50 (.18)	.72 (.17)	.72 (.24)	.84 (.15)	.46 (.27)	.58 (.27)	.63 (.27)	.65 (.30)	.81 (.20)	.81 (.16)	.85 (.21)	.85 (.16)
> 65	< 6 *n*=2M+4F	.05 (0.02)	.48 (.20)	.45 (.36)	.63 (.39)	.23 (0.00)	.37 (.22)	.12 (.11)	.43 (.25)	.52 (.34)	.68 (.08)	.77 (.27)	.92 (.05)
	[6-9] *n*=0M+0F												
	[10-12] *n*=1M+0F	.68 (0.00)		1.00 (0.00)		.77 (0.00)		.63 (0.00)		.82 (0.00)		.99 (0.00)	
	> 12 *n*=0M+0F												

M (SD), Mean (Standard Deviation); *M*, Male; *F*, Female; *n*, number of participants.

For sadness, three variables explained 20% of the variance (Adj. R^2 = .20, $F_{(3,492)}$ = 41.35, p < .001). Age significantly predicted accuracy (β = -.29, p < .001) as did the

years of education (β = .20, p < .001) and gender (β = -.11, p = .009). Specifically, the ability to identify sadness decreases with age, but increases with the years of education, and is better in the females than in the males. None of the interaction effects was significant.

For anger, two variables explained 6% of the variance (Adj. R^2 = .05, $F_{(3,493)}$ = 14.39, p < .001), namely *Age* (β = -.16, p = .002) and the years of education (β = .11, p = .028). The ability to identify the facial expression of anger decreases with age but increases with the years of education. None of the interaction effects was significant. The same two variables also explained 8% of the variance for fear (Adj. R^2 = .08, $F_{(3,493)}$ = 15.76, p < .001) and 17% of the variance for disgust (Adj. R^2 = .17, $F_{(3,493)}$ = 57.01, p < .001). Likewise, the ability to identify fear and disgust decreases with *age* (β = -.20, p < .001, and β = -.18, p < .001, respectively) but increases with the years of education (β = .14, p = .007, and β = .30, p < .001, respectively). None of the interaction effects was significant for fear nor disgust. For surprise, only the years of education explained 7% of the variance (Adj. R^2 = .07, $F_{(3,494)}$ = 38.13, p < .001), with the ability to identify this expression increasing with education (β = .27, p < .001). None of the interaction effects was significant. None of the variables significantly explains the identification of happiness (F < 1) and none of the interaction effects was significant. These results are presented in Table 5 and because none of the interaction effects was significant, they were not included in the model.

Due to the significant effect of gender on the identification of sadness, we decided to scrutinize whether the gender of the actors in the photographs also had some influence. Simple regression analysis indicated that the gender of the actors did not explain the variance for any of the emotional categories (Table 6).

Table 5

Summary of Multiple Regression Analyses for Gender, Age and Education Variables Predicting Identification of Basic Emotions facially Expressed (N = 496)

	Sadness			Anger			Fear			Disgust			Surprise			Happiness		
Variables	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Constant	19.98	1.67		39.21	2.42		8.21	.83		29.31	3.91		23.40	1.84		72.00	3.86	
Part. Gender[1]	-.79	.30	-.11 **	-.41	.43	-.04	-.07	.15	-.02	-.86	.70	-.05	.45	.33	.06	-.35	.70	-.02
Age	-.16	.03	-.29 ***	-.12	.04	-.16 **	-.05	.01	-.20 ***	-.23	.06	-.18 ***	-.05	.03	-.09	.02	.06	.02
Education	.38	.09	.20 ***	.26	.13	.11 *	.04	2.71	.14 **	1.29	.21	.30 ***	.44	.10	.23 ***	.09	.21	.02
R^2	.20			.06			.09			0.18			.07			.000		
Adj. R^2	.20			.05			.08			0.17			.07			-.005		
F	41.35 ***			14.39 ***			23.56 ***			52.55 ***			38.13 ***			0.15		

Part. Gender[1], Participant Gender Male; * $p < .05$; ** $p < .01$; *** $p < .001$

Table 6
Summary of Simple Regression Analyses for Gender of the Pictures (N = 496)

	Sadness			Anger			Fear			Disgust			Surprise			Happiness		
Variables	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Constant	347.37	22.85		402.55	19.45		322.98	24.92		315.28	9.52		395.19	14.53		443.98	10.78	
Pict. Gender	-19.03	15.87	-.23	-3.70	12.71	-.04	-21.18	14.77	-.40	.42	5.95	.10	-2.79	8.95	-.06	-12.72	6.77	-.20
R^2		.05			.002			.16			.0009			.003			.04	
Adj. R^2		.02			-.02			.08			-.02			-.03			-.03	
F		1.44			.09			2.06			.005			.097			3.53	

Pict. Gender = Gender of the actor in the pictures (1 = Female)

Discussion

We took advantage of a large sample of participants, who were evaluated with a shortened version of the original NimStim data set to clarify the putative influence of gender, age, and number of years of education on the ability to identify basic, facially expressed emotions. Our three hypotheses were partially supported since predictions seem to be emotion-specific for each of the sociodemographic variables, as explain below.

Results suggest that the identification of anger, fear, disgust, surprise and happiness in facial expressions is independent of gender. The only exception is sadness, where females seem to have an advantage over males. The effects of gender on the identification of sadness have been seen in previous researches (Mandal & Palchoudhury, 1985; Nowicki & Hartigan, 1988) and could be due to a detectable different set of neural correlates that men and women use when processing some sad expressions (Lee et al, 2002). . However, it must be taken in consideration that the incidence of depression is twice in women than in men (Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993; Weissman et al., 1996). Also, Leppänen (2006) in a review of studies has verified that this condition is related with a higher, negative facial affect, including faces of sadness, even after the remission of symptoms. Contrary to others researchers we did not find an advantage of women in the identification of fear (Nowicki & Hartigan, 1988), nor the advantage of men in the identification of anger (Mandal & Palchoudhury, 1985; Rotter & Rotter, 1988; Wagner et al., 1986). This discrepancy between our results and the ones published by others, may be due to methodological differences, such as the time of exposure (Donges, Kersting, & Suslow, 2012), the time allowed for response, or the emotional intensity of the stimuli. Our results are in line with others in which unlimited exposure times were allowed

(Hampson et al., 2006) and, as stated before, no gender differences were found in other studies using highly expressive faces, even if women seem more accurate than men in recognizing subtle displays of emotion (Hoffmann et al., 2010). Future research should take the potential modulation effects of these methodological variables into account.

Furthermore, some authors have emphasized that participants may perceive male and female faces portraying emotions differently (Hofmann, Suvak & Litz, 2006). In fact, individuals recognize better angry in males facial expressions and happiness in females facial expressions (Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007). Also, there is some evidence of an interaction between gender of the poser and gender of the participant and a very recent study suggests that men recognise emotions from women eyes worse than from males eyes with this effect being related to a lack of activation in limbic regions of the brain (Schiffer, Pawliczek, Müller, Gizewski, & Walter, 2013). Future research should study if there are some influence of interaction between the gender of participants and the gender of the pictures in the ability to identify facial emotions.

We have showed that age is a good predictor for the recognition of negative emotions, namely sadness, anger, fear, and disgust, since the ability to identify them seems to decrease with ageing. This finding agrees with studies reporting that young adults tend to perform better than older ones on the recognition of negative emotions, including the ones mentioned above (Calder et al., 2003; MacPherson et al., 2002; Mill et al., 2009; Phillips et al., 2002; Sullivan & Ruffman, 2004; Suzuki et al., 2007). The thesis that the increasing difficulty in recognizing emotions with aging is associated with normal cognitive decline is supported by studies showing that fluid intelligence (Salthouse, 2004), perceptual speed, and memory, decline with ageing (Martin &

Zimprich, 2005) and that age, after taking into consideration the effect of years of education, remains the principal factor which influences cognitive abilities (Kaufman, Kaufman, Liu & Johnson, 2009). However, the thesis of cognitive decline does not fully explain our results, as age did not influence the recognition of positive emotions (surprise and happiness). Indeed, our results are in line with the socioemotional selectivity theory (Carstensen, Mikels, & Mather, 2006), which states that the decreasing recognition of negative emotions is due to the avoidance or less sensivity to negative information - the "positivity effect" associated with aging (Carstensen & Mikels, 2005). Another hypothesis could be that the cognitive faculties involved in the ability to identify negative and positive emotions (or the underlying neural mechanism) decline differently with aging.

A recent study found that among older adults fluid and crystallized intelligence were significantly correlated to facial emotion recognition (Ruffman, Halberstadt, & Murray, 2009). And contrary to decreasing with aging of the fluid intelligence, the crystallized intelligence increases to the middle of 60s (Salthouse, 2004). So, it is possible that the decreases in fluid intelligence could be offset by crystalline intelligence with aging. However, this explanation would not explicate the differences in emotional valence by itself.

Still regarding the effects of age, it is possible that our results are due to emotions facially expressed are better identified in others of the same age group and the actors' age of the NimStim Data Set pictures have between 21 and 30 years old). Since, a previous study that has used happy and angry faces of younger and older actors, and young and older age participant groups were more accurate in identifying facial expressions in young compared with older faces (Ebner & Johnson, 2009). So, it would

also be useful to check if emotions are better recognized in others of the same age group, particularly negative emotions, but the actors' age of the NimStim Data Set (between 21 and 30 years old) does not allow such analysis.

Finally, our results suggest that more years of education is related to a better ability to recognize sadness, anger, fear, disgust, and surprise. These findings are consistent with the ones obtained by Mill et al. (2009) except for fear and disgust. Thus, increased education seems to potentiate the ability to recognize most primary emotions. This may occur because education stimulates cognitive abilities that are involved in the identification of facial expressions, but there many possible confounding variables. For example, more education means augmented opportunities for socialization and may lead to more experience in identifying emotions. Also, better education could be either a consequence of higher cognitive skills or higher socioeconomic status, which is also associated with the identification of facial expressions of emotion (Elfenbein, Marsh, & Ambady, 2002).

In summary, multiple regression analysis was used to study the importance of gender, age and number of years of education, on the ability to identify facial expressions of basic emotions. We found relevant emotion-specific effects for age, education, and gender, but interactions between those sociodemographic variables does not seem to have a significant influence. Overall, age influences the identification of sadness, anger, fear and disgust, while education is shown to be relevant for identifying all basic emotions, except happiness, and gender only exerts an effect on the identification of sadness. The amount of variance explained by these three variables (between 6% and 20%) highlight the importance of this study. Simultaneously, these results also suggest that other variables, either biological (e.g., hormone concentration),

psychological (e.g., cognitive abilities), or social (e.g., ethnic background) need to be considered in the identification of basic emotions.

In future research it will be useful to study if there are some influence of interaction between the gender of participants and the gender of the pictures in the ability to identify facial emotions, and using actors of different age-groups and displaying similar intensity of different emotions in order to investigate the influence of the age of actors in the ability to recognize emotions facially expressed.

Conclusion

This study advances our knowledge about the influence of three relevant sociodemographic factors - gender, age, and number of years of education - on the ability to identify basic emotions in facial expressions. Although NimStim set data is being widely used in psychology and related fields, such as cognitive and affective neuroscience, the association between these sociodemographic factors and the identification of emotions was thoroughly studied in this research, using this data set for the first time. Our data clearly reveal the importance of the influence of the three sociovariables studied in the ability to recognize the six basic emotions facially expressed in a healthy European sample. Female gender is a predictor of a better identification of sadness. Ageing predicts the progressive decline in the identification of negative emotions namely sadness, anger, fear and disgust. A higher level of education also predicts a better identification of the same negative emotions, as well as surprise. These findings highlights the need to control these sociodemographic factors in studies that have the identification of facial expressions of emotion as a variable, and may provide data for cross-cultural studies. Also, the normative data provided here may be

useful for clinicians in the assessment of this ability, allowing a more efficient use of the NimStim Data Set in clinical settings.

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Appendix

List of the selected photographs of NimStim for Portuguese (N = 261)

01Fanc	01fdio	01fhao	01fsac	01fspo	02fano	02fhao	02fsac	02fspo
03fano	03fdic	03fdio	03fhac	03fhao	03fhax	03fsac	03fsao	05fanc
05fano	05fdio	05fhao	05fsac	05fspo	06fdic	06fdio	06fhac	06fhao
06fspo	07fanc	07fano	07fdio	07ffec	07ffeo	07fhac	07fhao	07fhax
07fsac	07fsao	07fspo	08fano	08fdio	08ffeo	08fhac	08fhao	08fhax
08fspo	09fanc	09fano	09fdic	09fdio	09fhac	09fhao	09fhax	09fsac
09fspo	10fanc	10fano	10fdio	10fhac	10fhao	10fspo	11fdic	11fhac
11fhao	11fhax	11fspo	12fanc	12fdic	12fdio	12fhac	12fhao	12fhax
12fsac	12fsao	12fspo	13fdic	13fdio	13fhao	13fsac	13fsao	13fspo
14fanc	14fano	14fdic	14fdio	14ffeo	14fhac	14fhao	14fhax	14fsao
14fspo	15fdic	15fdio	15fhac	15fhao	15fhax	15fsac	16fanc	16fdic
16fdio	16ffeo	16fhao	16fhax	16fsac	17fanc	17fano	17fdic	17fdio
17fhac	17fhao	17fhax	17fspo	18fanc	18fano	18fdio	18fhac	18fhao
18fhax	18fsac	18fspo	19fano	19fdio	19fhao	19fhax	19fsac	19fsao
19fspo	20manc	20mano	20mdio	20mhac	20mhao	20mhax	20mspo	21mano
21mdic	21mdio	21mhac	21mhao	21mhax	21mspo	22manc	22mano	22mdic
22mdio	22mhac	22mhao	22mhax	23manc	23mano	23mdic	23mhac	23mhao
23mhax	23mspo	24mano	24mhac	24mhao	24mhax	24msac	24msao	24mspo
25fhao	25manc	25mano	25mhac	25mhax	25msac	25msao	25mspo	26manc
26mano	26mdio	26mhac	26mhao	26mhax	26msac	27manc	27mano	27mdic
27mdio	27mhao	27mhax	27msac	27mspo	28mdic	28mdio	28mhac	28mhao
28mhax	28mspo	29mano	29mdic	29mdio	29mhao	29mspo	30mhao	30mspo
31mano	31mdic	31mdio	31mhao	31mhax	31msac	31mspo	32mano	32mhao
32mhax	32mspo	33mdio	33mhac	33mhao	33mhax	33mspo	34manc	34mano
34mdic	34mdio	34mhac	34mhao	34mhax	34mspo	35manc	35mano	35mdio
35mhac	35mhao	35mhax	35mspo	36manc	36mano	36mdic	36mdio	36mfeo
36mhac	36mhao	36mhax	36msac	36msao	36mspo	37manc	37mdic	37mfeo
37mspo	38mano	38mdic	38mfeo	38msac	38mspo	39mfeo	40mano	40mdic
40mfeo	40mspo	41mdic	42mdic	42mdio	42mfeo	43mdic	43mfec	43mfeo

CAPÍTULO 3

REDUCED GALVANIC SKIN RESPONSES TO FACIAL EXPRESSIONS OF EMOTIONS IN PSYCHOPATHS: AN EXPLORATORY STUDY[5]

[5] Apresentado ao 14th World Congress of Psychophysiology e publicado [abstract] no International Journal of Psychophysiology, 2008; *69* (3):268. DOI:10.1016/j.ijpsycho.2008.05.213

Resumo

Introdução: Investigações prévias revelaram que os psicopatas são caraterizados por um padrão relativamente específico de funcionamento emocional, embora as reações psicofisiológicas a expressões faciais ainda tenham sido pouco estudadas. A presente pesquisa teve como objetivo explorar as diferenças nas respostas psicofisiológicas a expressões de diferentes emoções entre psicopatas e não-psicopatas.

Método: As respostas emocionais de seis psicopatas masculinos, avaliados pela Hare Psychopathy Checklist - Screening Version (PCL:SV), foram comparados com dez participantes não-psicopatas emparelhados quanto ao sexo e à idade. As respostas emocionais foram induzidas por um conjunto de imagens faciais do NimStim Data Set, aleatoriamente exibidas, mostrando raiva, tristeza, felicidade, nojo, surpresa e medo. A condutância elétrica da pele e a temperatura cutânea foram avaliadas como medidas da dimensão da ativação de respostas emocionais.

Resultados: Em geral, os psicopatas são menos responsivos às expressões emocionais do que os não-psicopatas, quando medidas através de ativação autonómica. No entanto, os resultados só mostram diferenças significativas entre os grupos nas respostas de condutância elétrica da pele (corrigida à BL) de faces expressando medo (psicopatas < não-psicopatas). Mudanças na temperatura cutânea não foram diferentes entre os grupos, embora os psicopatas mantivessem uma tendência de menor responsividade, com exceção para as faces expressando surpresa e raiva.

Conclusão: Os resultados apoiam a teoria de que os psicopatas mostram uma hiporreatividade emocional que parece generalizável ao processamento das expressões faciais de outras pessoas, mas os padrões de resposta psicofisiológica a emoções específicas devem ser mais explorados. Considerando que este estudo é exploratório, é

necessário ter mais participantes e outras medidas autonómicas para conclusões mais finas.

Palavras-chave: processamento de faces, psicopatia, resposta galvânica da pele.

Abstract

Background: Research has revealed that psychopaths are characterised by a relatively specific pattern of emotional functioning, though their psychophysiological reactions to facial expressions are still scarcely examined. The present research was aimed to explore differences in the psychophysiological responses to expressions of different emotions in psychopaths and no-psychopaths.

Methods: The emotional responses of six male psychopaths as defined by the Hare Psychopathy Checklist - Screening Version (PCL:SV) were compared to ten gender and age-matched non-psychopaths. Emotional responses were elicited by a set of random faces from NimStim database, showing anger, sadness, happiness, disgust, surprise and fear. Phasic Skin Conductance and Temperature changes were assessed as measures of the arousal dimension of emotional responses.

Results: In general, psychopaths were less responsive to emotional expressions, as measured through autonomic arousal. Nevertheless, results only show significant differences between groups in Skin Conductance Responses (BL corrected) to faces expressing fear (Psychopaths < Non-Psychopaths). Changes in the Skin Temperature were not different between groups, although psychopaths maintained a tendency for lower responsiveness, except for faces expressing surprise and anger.

Conclusions: The results support the theory that psychopaths show an emotional hyporesponsiveness which seem generalizable to facial expressions of others, but psychophysiological response patterns to specific emotions shall be further explored. Considering that this study is exploratory, it is necessary to have more participants and other autonomic measures for finer conclusions.

Keywords: face processing, psychopathy, galvanic skin responses.

Background

Psychopathy is a personality disorder characterised by a specific complex of affective, interpersonal, and behavioural traits (Cleckley, 1941; Hare, 1991).

An emotional processing dysfunction has been identified as the basis of psychopathy (Cleckley, 1941). The emotional information processing requires a correct recognition and an effective extraction of meaning in the different facial expressions (Gray, 1987) and plays an important role in social interaction (Martens, 2003).

By this reason, the recognition of emotions on facial expressions is under the scrutiny of scientific research in the field of psychopathy (Blair et al., 2002; Blair et al., 2004, Dadds et al., 2006; Blair, Colledge, Murray & Mitchell, 2001; Hastings, Tangney & Stuewig, 2008: Stevens, Chraman, & Blair, 2001) and, also, in the field of the anti-social behaviour (Carr & Lutjemeier, 2005; Woodbury-Smith et al., 2005).

Previous research has indicated that psychopathy is related with a general deficit in processing affective information, regardless of whether the stimuli are of aversive or appetitive valence, and an emotional hypo-responsiveness (Verona, Patrick, Curtin, Lang, & Bradley, 2004).

It is not consensual if antisocial behaviour is a secondary symptom of psychopathy (Cooke, Michie, Hart, & Clark, 2004). It is also unknown if all the psychopaths have an increased risk to criminal conduct, even though not all succumb to that risk.

Better knowledge of the specificity of dysfunctions related to facial emotion identification associated with psychopathy and antisociality would clearly permit understanding the psychophysiological correlates of psychopathy and of antisocial

behaviour. However, psychophysiological reactions to facial expressions are still scarcely examined in psychopaths and in antisocial offenders.

The present research was aimed to explore differences in the psychophysiological responses to expressions of different emotions between psychopaths and non-psychopaths, both criminal offenders.

Methods

Participants

Two groups of male criminal individuals were studied: a psychopath group (PG) with six psychopaths and a non-psychopath group (NPG) with 10 individuals.

The groups were age matched (M_{NPG} = 41.56 years old, *SD* = 12.02; M_{PG} = 42.20, *SD* = 8.17) and had a similar number of years of school frequency (M_{NPG} = 6.78, *SD* = 2.22; M_{PG} = 6.80, *SD* = 4.09).

Participants had no record of psychiatric diseases, neurological pathologies, or cognitive, sensorial and motor deficits that could interfere with the assessment.

Materials and Procedure

Materials

NimStim Data Set. Twelve pictures from the Portuguese validation of NimStim (NimStim-PT) (Iria, Paixão, & Barbosa, 2008) were used. The selected pictures comprised colour photographs on a white background showing male and female actors expressing the six basic emotions: happiness, sadness, anger, fear, surprise, and disgust

(two photographs per emotion).

Psychopathy Checklist: Screening Version (PCL:SV) (Hart, Cox & Hare, 1995, Portuguese version gently granted by Soeiro, which is a 12 item checklist, was applied to assess psychopathy. This checklist has an interrelated factorial structure, in which the first factor reflects the affective and interpersonal aspects of psychopathy, and the second factor reveals the antisocial behaviours. Participants who scored higher than 18 were classified as psychopaths.

Psychophysiological device. A computerized polygraph system, model I-330-C2 from JJ Engineering (Poulsbo, Washington) was used to record the psychophysiological data.

Procedure

Participants were shown a set of facial expressions of emotions while monitoring the skin conductivity.

The pictures were shown in colour over a white background (for 10 sec each with no ISI). The presentation order was randomised and photographs were presented sequentially, without any kind of feedback. Pictures were administered on a notebook (14.1'' screen) placed 1meter in front of the participants, running Superlab V4.0 (2008, Cedrus corp., San Pedro, USA). Data were collected in a laboratory room with controlled temperature (20-25º C). All telephones and others electrical devices were turned off during the electrodermal recordings.

Psychophysiological Protocol (Skin Conductance). Skin conductance electrodes were attached to the distal phalanges of the index and middle fingers of the non-dominant hand, allowing participants to use their dominant hand to press the keypad. The EDA (Electro Dermal Activity) amplifier was connected to a laptop computer running Physiolab USE3 software (by JJ engineering, Poulsbo, WA) in Windows XP, which was used for the electrodermal recordings. The I-330 system contained a built in optical interface to prevent electrical hazards. After the electrodes had been attached, the participant sat in a resting state for four minutes in order to record the tonic level. Immediately after this initial period, the exhibition of the pictures started. Participants were instructed to observe the pictures.

Phasic Skin Conductance and Temperature changes were assessed as measures of the arousal dimension of emotional responses. The final results were found computing the mean amplitude values obtained for each emotion minus the mean amplitude of baseline [i.e., mean amplitude value obtained during the last 60 seconds (s) of the resting period].

Results

In general, psychopaths were less responsive to emotional expressions than non-psychopaths, as measured through autonomic arousal. Nevertheless, *t*-tests results only show significant differences between the groups in Skin Conductance Responses (BL corrected) to faces expressing fear. The results are shown in Table 1.

Changes in the Skin Temperature were not different between groups, although psychopaths maintained a tendency for lower responsiveness, except for faces expressing surprise and anger (Table 2).

Table 1
Mean of peak amplitudes of SCR (in μSiemens) (BL corrected) of Non-Psychopath Group (PG) and Psychopath Group (PG) for each emotion (mean ± SD)

	NPG	PG	*p*	*t value*
Happiness	.75±.99	.27±.38	.28	1.13
Sadness	.61±1.09	.45±.84	.78	.29
Anger	-.74±3.53	.50±.89	.42	-.83
Surprise	.72±1.23	.54±1.11	.78	.29
Disgust	.22±1.07	.88±.37	.39	.88
Fear	1.06±1.09	.05±0.18	.04*	2.22

*, $p < .05$

Table 2
Mean of Amplitudes of Skin Temperatures values (in degree Celsius) (BL corrected) of Non-Psychopath Group (PG) and Psychopath Group (PG) for each emotion (mean ± SD)

	NPG	PG	*p*	*t value*
Happiness	.04±.37	-.08 ±.21	.47	.75
Sadness	.01±.39	-.13±.39	.49	.72
Anger	-3.66±.54	-.14±.38	.39	-.89
Surprise	-.97±.38	-.13±.30	.56	-.60
Disgust	.04±.35	-.16±.28	.25	1.20
Fear	.06±.40	-.17±.26	.24	1.24

Discussion

Our results of low autonomic responsivity in individual with a high psychopathic level are in line with previous studies, thus, supporting the theory that psychopaths, when compared to non-psychopaths, show emotional hypo-responsiveness (Arnett, 1997; Hare, 1978), which seems generalizable to the processing of emotional information on facial expressions of others, particularly to the emotion facially

expressed of fear.

Although the results of this study are in line with those of other investigations, suggesting that psychopaths show reduced reactivity to facial expressions (Herpertz et al, 2001; Pastor, Molto, Vila, & Lang, 2003), mainly to negative emotional stimuli (Babcock, Charles, Webb, & Yerington, 2005; Patrick, Cuthbert, & Lang, 1994; Verona et al, 2004), they should be interpreted with some caution, given the methodological conditions used in our study. Thus, in the limit, these results may indicate that psychopaths were not focused on the task, since there was no express reference to the identification of the emotions, in which case only require a clearer statement to obtain an equivalent group of non- psychopaths performance indication. This explanation supports the hypothesis of attention deficit, whereby the antisocial are characterized by specific difficulties in focusing attention on events in the surrounding environment (Raine & Vernables, 1984).

Alternatively, psychopaths can have a long latency and/or response to facial expressions of fear greater than non - psychopaths (Rose, 2011) since the responses of this group to the facial expression of fear had been extended in time period of the next stimulus.

We also observed that the SCR mean amplitude seems to be a better tool to differentiate the autonomic response between psychopaths and non-psychopaths than mean amplitude of skin temperature. And, despite the time of exposure to each stimulus is long (10 seconds), the analysis of the traces, by visual inspection, showed that the absence of inter-stimulus (ISI) interval did not allow all subjects completing the recovery time before the next stimulus. However, psychophysiological response patterns to specific emotions should be further explored. Considering that this study is

exploratory, it is necessary to increase sample size for finer conclusions.

As a closing remark, this study draws attention to the importance of further research, involving inmate offenders and participants from the general population, in order to achieve a better understanding of the nature and extension of emotional processing deficits in psychopathy.

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CAPÍTULO 4

PSYCHOPHYSIOLOGICAL AROUSAL IN A TASK OF IDENTIFICATION OF EMOTIONS IN FACIAL EXPRESSIONS IN ANTISOCIALS [6]

[6] O presente trabalho foi apresentado ao 15th World Congress of Psychophysiology e publicado [abstract] no International Journal of Psychophysiology, 2010; *77* (3):274. DOI:10.1016/j.ijpsycho.2010.06.120

Resumo

Introdução: Estudos anteriores investigaram os défices no funcionamento de antissociais. A resposta da condutância da pele (SCR), como uma medida de ativação, pode ser útil para compreender a base emocional do comportamento antissocial. O presente estudo teve como objetivo comparar a ativação psicofisiológica durante uma tarefa de identificação emocional em indivíduos antissociais (criminosos reincidentes) e controlos.

Método: Foi comparado o nível médio de condutância elétrica da pele em 54 criminosos reincidentes e 45 não-criminosos, emparelhados quanto ao sexo e à idade. Um conjunto de 12 fotografias retiradas do NimStim Data Set (mostrando raiva, tristeza, alegria, nojo, surpresa e medo – duas fotografias de cada emoção) foi exibido aleatoriamente como estímulos emocionais. O nível médio da condutância eletrodérmica SC (corrigido à linha basal) foi usado como o índice de ativação psicofisiológica, enquanto os participantes identificavam as emoções.

Resultados: Em comparação com os controlos (M = 0.28, SD = 0.50), os participantes antissociais (M = 0.76, SD = 1.17) foram caracterizados pelo aumento da ativação eletrodérmica na identificação das expressões emocionais. Diferenças significativas entre os grupos em relação ao nível médio da SCR (p < .001) foram também observados.

Conclusão: Os resultados não suportam a tese de que os antissociais, em geral, tendem a apresentar menor excitação na ativação psicofisiológica nesta tarefa emocional. No entanto, uma análise mais aprofundada de subgrupos poderá sugerir que isso pode ser verdade para os indivíduos psicopatas, sejam criminosos ou não, em comparação com os seus controlos homólogos. Além disso, o aumento da ativação pode representar um aumento de dificuldade na realização da tarefa. Finalmente, os padrões

de resposta psicofisiológica a emoções específicas deve ser mais explorado e este estudo deve ser complementado por paradigmas de reconhecimento, além de identificação.

Palavras-chave: resposta galvânica da pele, antissocial, expressões faciais, emoções.

Abstract

Background: Vast research has been focused on identifying emotional functioning deficits in antisocials. Skin Conductance (SC), as a measure of arousal, may be useful to understand the emotional basis of the antisocial behaviour. The present research was aimed to compare the psychophysiological arousal during an emotional identification task in antisocial individuals (criminal recidivists) and controls.

Methods: Mean skin conductance level in 54 criminal recidivists and 45 non-criminals, gender and age-matched, were compared. A set of 12 random faces from NimStim database (showing anger, sadness, happiness, disgust, surprise, and fear – two of each) were applied as emotional stimuli. Mean SC level (BL corrected) was used as index of psychophysiological arousal while participants were identifying emotions.

Results: Compared with controls (M = 0.28, SD = 0.50), antisocial participants (M = 0.76, SD = 1.17) were characterised by increased electrodermal arousal while identifying emotional expressions. Results revealed significant differences between groups in mean SC level (p <. 001).

Conclusions: Results did not support the thesis that antisocials in general tend to exhibit lower psychophysiological arousal in this particular emotional task. However, further subgroup analysis suggests that this may be true to psychopatic individuals, either criminal or not, in comparison to their homologous controls. Also, increased arousal may represent increased difficulty to perform the task. Finally, psychophysiological response patterns to specific emotions shall be further explored and this study shall be complemented by recognition paradigms in addition to identification.

Keywords: galvanic skin responses, antisocial, facial expressions, emotions.

Background

Biased processing of emotional information, particularly the misunderstanding of social cues may underlie deficits in social skills and, between other factors, could be related to an increased risk for criminal behaviour (Loeber, 1990). For this reason, research has been focused on identifying emotional functioning deficits in antisocial individuals.

Facial expression stimuli have been used because they evoke emotional responses in individuals (Marsh, Ambady, & Kleck, 2005), including autonomic (skin conductance) arousal (Blair & Cipolotti, 2000). In fact, past research suggested that an under arousal autonomic system to emotional inducing material (including facial expressions), which may compromise successful social and emotional processing, contributes to a failure in social behaviour (Heims, Critchley, Dolan, Mathias, & Cipolotti, 2004).

The studies with institutionalized offenders under arousal in are very few in number and are not well-replicated (Scarpa & Raine, 1997). In addition, contradictory data has been found in offenders samples, for example, suggesting a physiologically hyper-reactivity, in general presented by physical child abusers (McCanne & Hagstrom, 1996).

Skin conductance (SC) is an autonomic index directly under the control of the sympathetic system (Dawson, Schell & Filion, 2000). Skin Conductance Response (SCR) is based in modifications in the sweating activity of the skin, imputable to quick fluctuation in eccrine sweat gland activity, which result from the liberation of acetylcholine by the sympathetic nervous system (Khalfa, Peretz, Blondin, & Manon 2002).

So, SCR as a measure of arousal, between others, could be useful to understand the emotional basis of the antisocial behaviour.

The present research was aimed to compare the psychophysiological arousal during an emotional identification task in antisocial individuals (criminal recidivists) and controls in Portugal.

Methods

Participants

Two groups of male individuals were studied: a criminal recidivist group (CRG) of 54 individuals, and a non-criminal group (NCG) of 45 individuals.

The groups were age matched (M_{CRG} = 39.06 years old, *SD* = 8.98; M_{NCG} = 37.07, *SD* = 10.95) and successfully attended school for a similar number of years (M_{CRG} = 7.72, *SD* = 2.67; M_{NCG} = 8.20, *SD* = 3.12).

Materials

NimStim Data Set. Twelve pictures from the Portuguese validation of NimStim (NimStim-PT) (Iria, Paixão, & Barbosa, 2008) were used. The selected pictures comprised colour photographs on a white background showing male and female actors expressing the six basic emotions: happiness, sadness, anger, fear, surprise, and disgust (two photographs per emotion).

Psychophysiological device. A computerized polygraph system, model I-330-C2 from JJ Engineering (Poulsbo, Washington) was used to record the psychophysiological data.

Procedure

Participants observed a set of facial expressions of emotions while monitoring the skin conductivity.

The pictures were shown in colour over a white background (10 seconds presentation time and 10 seconds inter-stimulus interval per picture (ISI). The presentation order was randomised and photographs were presented sequentially, without any kind of feedback. Pictures were administered on a notebook (14.1'' screen) placed 1meter in front of the participants, running Superlab V4.0 (2008, Cedrus corp., San Pedro, USA). Data were collected in a laboratory room with controlled temperature (20-25º C). All telephones and others electrical devices were turned off during the electrodermal recordings.

Psychophysiological Protocol (Skin Conductance). Skin conductance electrodes were attached to the distal phalanges of the index and middle fingers of the non-dominant hand.

The EDA (Electro Dermal Activity) amplifier was connected to a laptop computer running Physiolab USE3 software (by JJ engineering, Poulsbo, WA) in Windows XP, which was used for the electrodermal recordings. The I-330 system contained a built in optical interface to prevent electrical hazards. After the electrodes had been attached, the participant sat in a resting state for four minutes in order to record the tonic level. Immediately after this initial period, the exhibition of the pictures started. Participants were instructed to observe the pictures.

Mean SC level (Baseline corrected) was used as index of psychophysiological arousal while participants were observing the pictures with facial emotions.

Results

Final results were found by subtracting mean SC baseline level (10 seconds recording) from mean SC values (after 1 second post the first stimuli) of the complete 12 stimuli sequence and are presented in Table 1.

Table 1
Mean skin conductance (SC) level (in μSiemen, Baseline corrected) of Criminal Recidivist Group (CRG) and Non- Criminal Group (NCG)

	CRG	NCG
SC (*μSiemens*)	.76±1.17	.28±.50

When compared with controls (NCG), the criminal recidivist group (CRG) showed a significantly higher increase in the electrodermal arousal in the task of identifying emotional expressions ($t(97) = 2.56$, $p < .05$).

Discussion

Our results did not support the thesis that anti-socials, in general, tend to exhibit lower psychophysiological arousal in emotional identification tasks. In fact, in a meta-analysis, Lorber (2004) found that low resting and task EDA (electrodermal activity) are related with psychopathy/sociopathy and conduct problems, while EDA reactivity was positively related with aggression and negatively associated with psychopathy/sociopathy. Also, the study of Herpertz et al. (2001) suggests that individuals with psychopathy have an emotional hyporesponsiveness while individuals with borderline personality did not present this electrodermal pattern of response. In fact, our results could reflect the lack of specific diagnosis in our antisocial sample. In addition, our sample of antisocial individuals was large and according to Scarpa and

Raine (1997) it is possible that psychophysiologic under arousal may be specific of some covert and less severe forms of antisocial behaviour.

Another hypothesis that could explain the discrepancy between our results and those described in literature for similar experiments may be due to the experimental setting itself, which produced increased arousal in the criminal subjects. In fact, previous studies have shown that SCR increased with increasing difficulty of the information processing (De Swart & Das-Smaal, 1976). So, the increasing of SCR in antisocial may be related to the difficulty of the task to this group. In fact, the largest skin conductance response, may mean beyond the activation (Lang, Bradley, & Cuthbert, 1990), arousal, attention and anxiety (Henriques, Paiva, & Antunes, 2013). It may be due to the use of a particularly anxiogenic polygraphic equipment for this population, being regarded as the "lie detector".

In future researches psychophysiological response patterns to specific emotions should be further explored and this study should be complemented by recognition paradigms in addition to identification.

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CAPÍTULO 5

THE IDENTIFICATION OF NEGATIVE EMOTIONS THROUGH A GO/NO-GO TASK: COMPARATIVE RESEARCH IN CRIMINAL AND NON-CRIMINAL PSYCHOPATHS[7]

[7] O presente artigo encontra-se publicado em European Psychologist 2012; Vol.17 (4), 291–299, DOI:10.1027/1016-9040/a000101

Resumo

Este estudo compara o desempenho numa tarefa de identificação de emoções negativas (através de expressão facial) de ofensores do sexo masculino (*n* = 62), com um alto nível de psicopatia (*n* = 25), com outros criminosos com um baixo nível de psicopatia (*n* = 37), bem como com outros "psicopatas bem-sucedidos" (*n* = 12) e não-criminosos com um baixo nível de psicopatia (*n* = 39). Pretende esclarecer o processamento emocional negativo de criminosos e não-criminosos com alto ou baixo nível de psicopatia. Os participantes foram avaliados através do paradigma Go / No-Go, no qual tinham que identificar as expressões faciais de medo, tristeza e raiva. O nível de psicopatia foi avaliado pelo fator 1 de Hare PCL:SV. Ambos os grupos de psicopatas, criminosos e não-criminosos, apresentaram um pior desempenho do que as suas contrapartes não psicopatas na identificação de medo e tristeza. Uma hiperresponsividade à raiva e medo foi comum aos criminosos, psicopatas e não-psicopatas. Estes resultados reforçam a ideia de que a psicopatia está relacionada com uma baixa capacidade de identificar o medo e a tristeza em expressões faciais, independentemente da sua manifestação no comportamento criminal. Por sua vez, um padrão de resposta de erro na identificação, caracterizado por uma hiperresponsividade para o medo e a raiva, é comum a ambos os psicopatas e grupos criminosos, e parece ser a característica que distingue os três grupos em estudo dos controlos não-psicopatas não-criminosos.

Palavras-chave: identificação de expressões faciais, emoções, emoções negativas, psicopatia, comportamento criminal.

Abstract

This study compares the performance, when identifying negative emotions on facial expression, of male offenders (*n* = 62) with a high level of psychopathy (*n* = 25) with other criminals with a low level of psychopathy (*n* = 37), as well as other "successful psychopaths" (*n* = 12) and non-criminals with a low level of psychopathy (*n* = 39) in order to clarify the negative emotional processing of offenders and non-offenders that are either high or low in psychopathy. The participants were assessed on a Go/No-Go paradigm in which subjects had to respond to the facial expressions of fear, sadness and anger. The psychopathy level was obtained by factor 1 of Hare's PCL:SV. Both psychopathic groups, criminal and non-criminal, showed worse performance than their non-psychopatic counterparts on the identification of fear and sadness. An over-responsivity to both anger and fear was common to criminals, psychopaths and non-psychopaths. These results reinforce the idea that psychopathy is related to a poor ability to identify fear and sadness in facial expressions independently of its manifestation in criminal behavior. In turn, a misidentified response pattern, characterised by an over-responsiveness for fear and anger, is common to both psychopaths and the criminal groups, and it appears to be the characteristic that distinguishes the three groups under study from non-criminal non-psychopaths controls.

Keywords: facial expression identification, emotions, negative emotions, psychopathy, criminal behavior.

1. Introduction

Psychopathy is a personality disorder characterized by a specific complex of affective, interpersonal, and behavioral traits (Cleckley, 1976; Hare, 1991), as well as a deficit in social cognition and behavior (Richell et al., 2005). Although Antisocial Personality Disorder (APD) is the only diagnostic category considered in the DSM-IV TR (American Psychiatric Association, 2000), psychopathy has been related to a more specific case of APD (Dolan & Fullam, 2006) which is, in itself, an important subject for research. In fact, the study of this specific disorder, in contrast with the DSM-IV TR diagnoses that identify the broad category of individuals who engage in antisocial behavior, it has the advantage of allowing the identification of a population which shares a common etiology based on a dysfunction in specific forms of emotional processing (Blair, Mitchell, & Blair, 2005). However, it is unclear if the antisocial behavior is a feature of psychopathy (Gao & Raine, 2010) or a secondary symptom of the disorder (Cooke, Michie, Hart, & Clark, 2004). It is, also, poorly established if all psychopaths have an increased risk of criminal behavior (Hall & Benning, 2006). On the other hand, the full behavioral manifestation of the disorder is under considerable social influence (Blair, 2008), thus, showing the importance of psychosocial and environmental influences in discriminating successful and non-successful psychopaths (Gao & Raine, 2010). In spite of the influence of these factors on psychopathy, the basis of this disorder appears to be biological in both cases (Blair, 2008; Gao & Raine, 2010).

Assuming a shared personality structure, some authors suggest that non-criminal psychopaths are simply individuals that, up to that moment, have succeeded in escaping from justice, and are not very different from others in prison (Garrido, 2004; Hare, 2003). This seems to be the conclusion of studies of criminal and non-criminal

("successful" or "subcriminal") psychopaths, though in a very small number yet, indicating that the personality structure and the tendencies for criminal behavior may be similar in both populations (Forth, Brown, Hart, & Hare, 1996; Hare, 2004). Nevertheless, Gao and Raine (2010) recently suggested that successful psychopaths have intact or enhanced neurobiological functioning that underlies their normal or even superior cognitive functioning, which in turn helps them to achieve their goals using more covert and nonviolent methods. This scarce number of studies emphasizes the relevance of further study of "successful psychopaths", including not only the psychosocial aspects or neuropsychological differences between these individuals and criminal psychopaths (e.g., Ishikawa, Raine, Lencz, Bihrle, & Lacasse, 2001; Kirkman, 2005; Yang et al., 2005), but also the way they process emotions, as this is a nuclear characteristic of psychopathy. In fact, an emotional information processing dysfunction has long been identified as one of the core psychopathy features (Cleckley, 1941), and this is supported by empirical studies emphasizing amygdala dysfunction (Blair, 2006; Blair, 2001; Patrick, 1994) and abnormalities in other interconnected structures such as the orbitofrontal cortex (Damasio, 1994; Raine 2002) or the prefrontal-temporolimbic circuit (Weber, Habel, Amunts, & Schneider, 2008). This emotional processing is involved in the correct identification and effective extraction of meaning from different facial expressions (Gray, 1987), and plays an important role in social interaction (Martens, 2003). For this reason, the identification of emotions on facial expressions has been under the intense scrutiny of scientific research regarding psychopathy in particular (Blair, Colledge, Murray, & Mitchell, 2001; Blair et al., 2004, 2002; Dadds et al., 2006; Hastings, Tangney, & Stuewig, 2008; Stevens, Chraman, & Blair, 2001) and antisocial behavior in general (Carr & Lutjemeier, 2005; Marsh & Blair, 2008; Woodbury-Smith et al., 2005). Nonetheless, these findings are still controversial, as

some of these studies have not evidenced the referred deficits, either for psychopaths or antisocial individuals (Glass & Newman, 2006). Also, most researchers agree that there is an impairment in the identification of negative emotions such as fear, sadness or disgust, but prior studies report dissimilar results for different emotions (Blair et al., 2004, 2002, 2001; Dadds et al., 2006; Habel et al., 2002; Hastings et al., 2008; Stevens et al., 2001). As these inconsistencies could be the result of distinct methodologies, population differences or, even, particular analytic techniques (Marsh & Blair, 2008), more research specifically devoted to the study of dysfunctions concerning identification of emotions in facial expressions is needed to separate the emotional correlates of these personality disorders and their behavioral deviations, i.e. illegal conduct.

Bearing this in mind, the aim of this study is to clear up the emotional processing of offenders and non-offenders that are either high or low in psychopathy (defined by factor 1 of PCL:SV; Hare, 1991). Using four groups and three negative emotions (fear, sadness and anger) and applying an emotional identification Go/No-Go task, we tested if criminal individuals with a high level of psychopathy show a deficient ability to identify facial expressions of the negative emotions under study and, also, if this putative deficit can be generalized to non-criminals with a similar level of psychopathy and other offenders with low psychopathy and low psychopathic individuals with no criminal record.

2. Materials and methods

2.1. Participants and Selection Procedure

This research involved 113 Caucasian males, of which 62 were repeat offenders, and 51 did not have any criminal convictions. Depending on the factor 1 score of the PCL:SV (as explained ahead), the participants were divided into an experimental group of criminals with a high level of psychopathy (CH, n = 25), and three other groups: criminals with a low level of psychopathy (CL, n = 37), non-criminals with a high level of psychopathy (NCH, n = 12), and non-criminals with a low level of psychopathy (NCL, n = 39).

The criminals (with high and low levels of psychopathy, CH and CL) were recruited via public announcements in associations providing support to ex-prisoners.

All offenders had two or more effective convictions. The mean number of convictions was 2.72 for CH (SD = 1.17) and 2.65 for CL (SD = 0.79). These crimes involved a mean of 7.59 years of incarceration for CH (SD = 5.30), and 7.02 years for CL (SD = 3.45). In either case, there were no significant differences between groups.

Detailed criminal typology may be seen in Table 1.

Table 1
Criminal typology of participants with high (CH) and low (CL) levels of psychopathy.

Crimes typology	CH (n=25)	CL (n=37)
Pp, Pt, St, Dg	3	4
Pp,Dg	1	1
Pt,St	1	1
Pt,Dg	4	6
St,Dg	1	1
Pp	3	6
Pp,Pt, Dg	1	2
Pt	3	6
Pp, Pt	3	3
Dg	4	6
St	1	1

Pp, crimes against people (murder, grievous bodily harm, domestic violence, kidnapping, illegal restraint, rape, trafficking of human beings); Pt, crimes against patrimony (theft, organized or armed robbery, swindling, racketeering and extortion, handling stolen goods); St, crimes against society (forgery of administrative documents, counterfeiting of currency, forgery of means of payment, arson); Dg, illicit trafficking in narcotic drugs and psychotropic substances.

Non-criminal participants (NCH and NCL) were recruited by announcements in different places (such as social, cultural and sports associations). These participants reported never having committed a criminal offense and their criminal records were subsequently verified.

All participants were informed of the aims, methods, potential risks of the research, their right to quit at any time during the research process, the confidential nature of the data and their benefits (each participant received 30€ for their participation in the study). The authorization for the analysis of their official records and lawsuits was also explicit in the informed consent. All participants accepted to take part in the experiment and none quit during the tasks.

A total of 69 subjects were recruited for the criminal groups, but seven were excluded for psychiatric and neurologic reasons, following a clinical interview and a mental state examination conducted by a senior clinical psychologist, aiming to screen for psychiatric illnesses, neurological pathologies, or cognitive, sensorial and motor deficits that could interfere with the tasks.

During the screening interview, an intelligence test for abstract reasoning was applied to ensure that participants had no intellectual disabilities. This test, known as IA Test (*Teste de Inteligência Abstrata*), is a shortened version of Raven's Matrices, standardized to the Portuguese population with a sample of 3228 participants (2937 males) (Amaral, 1966). It comprises five series (A, B, C, D, and E) of six items each (30 in total). In each item, the participant is asked to identify the missing segment (between six to eight alternative segments) which is required to complete a larger pattern. Each correct response corresponds to one point, in a maximum of 30 points.

There were no statistical differences, using Factorial ANOVA for a 5% significance level, between groups concerning age ($F_{(3,109)} = .57$, $p = .63$), intellectual ability ($F_{(3,109)} = 2.22$, $p = .09$) and educational level ($F_{(3,109)} = 2.40$, $p = .07$). Descriptive statistics are presented in Table 2.

Table 2
Mean and standard deviations [Mean (SD)] for age, education, IA Test and Factor 1 PCL:SV on the four groups: criminals with high psychopathy (CH), criminals with low psychopathy (CL), non-criminals with high psychopathy (NCH) and non-criminals with low psychopathy (NCL).

Groups	*n*	Age (years) *Mean (SD)*	Education (years) *Mean (SD)*	IA Test *Mean (SD)*	Factor 1 PCL:SV *Mean (SD)*
CH	25	40.76 (10.03)	7.64 (3.50)	14.56 (3.58)	8.48 (1.39)
CL	37	38.70 (8.98)	7.30 (2.05)	16.24 (3.53)	4.29 (2.48)
NCH	12	36.75 (8.87)	6.42 (2.35)	18.08 (3.48)	8.75 (1.91)
NCL	39	37.87 (11.63)	8.62 (3.16)	15.87 (4.50)	3.67 (1.18)

IA Test - Test for Abstract Reasoning; PCL: SV - Psychopathy Checklist: Screening Version.

Finally, in order to control the effects of "dependency or serious abuse of alcohol or drugs" on the experimental results, since some studies relate this dependency to emotional identification deficits (Serrano, Lozano, Garcia, & Garcia, 2010), all participants were asked if they had been dependent or abusive consumers of alcohol or drugs for at least six months. In spite of the different number of participants in each group that reported dependency or serious use of alcohol or drugs (CH = 19, CL = 28, NCH = 2, NCL = 7; $X^2 = 0.000$, $p = 1.00$), this variable did not interfere with the experimental results, since there was no statistical differences, using *t*-test procedure for a 5% significance level, between those who reported consumption and those who reported no consumption in the results of the emotional Go/No-Go Paradigm. Statistics are presented in Table 3.

Table 3

Adjusted mean and standard deviations [Adj Mean (SD)], degrees of freedom (df), t-test and probability's values for effects of continued consumption of illicit drug and/or alcohol on fear, sadness and anger, evaluated by measuring omissions (Om), false-alarms errors (FA), and reaction time, in milliseconds, in false–alarms errors (RT).

Emotion	Measures	Consumption Group (*n*=56) *Adj Mean (SD)*	Non-Consumption Group (*n*=57) *Adj Mean (SD)*	*df*	*t*	*p*
Fear	Om	2.82 (2.27)	2.14 (2.20)	60	-0,05	0.96
	FA	11.23 (5.56)	9.39 (6.32)	60	-0,35	0.73
	RT	1028.85 (247.17)	1066.14 (262.63)	60	-0,51	0.61
Sadness	Om	2.25 (1.80)	2.25 (1.68)	60	-0,37	0.71
	FA	7.46 (4.20)	6.16 (4.25)	60	0,52	0.61
	RT	1221.37 (291.52)	1007.76 (291.52)	60	0,52	0.60
Anger	Om	1.34 (1.64)	1.51 (1.61)	60	-0,81	0.42
	FA	6.57 (4.55)	5.32 (4.49)	60	-0,98	0.33
	RT	912.58 (248.50)	930.81 (283.12)	56	-0,12	0.90

2.2 Psychopathy Checklist: Screening Version (PCL:SV)

The PCL:SV (Hart, Cox, & Hare, 1995, Portuguese version by Soeiro, 2002) is a 12 item checklist intended to assess psychopathy, and can be considered a short version or a parallel version of PCL-R (Cooke, Michie, Hart, & Hare, 1999). This checklist has an interrelated factorial structure, in which the first factor reflects the affective and interpersonal aspects of psychopathy, and the second factor reveals the antisocial behaviors.

Participants were classified using only the factor 1 of PCL:SV because: (1) the affective dimension of psychopathy represented by factor 1 items was the main goal of the study; (2) previous studies found a relationship between factor 1 and inadequate emotional stimulus responses (Patrick, Bradley, & Lang, 1993); (3) factor 1 occurs at the higher level of the psychopathy construct and in the most extreme cases whereas Factor 2 items are present at both higher and lowers levels of the construct (Hare, 1998); (4) as a procedure to avoid the probably contamination resulting from using the sampling criteria that emphasize antisocial behavior (Patrick & Zempolich, 1998), since criminal psychopaths were put in comparison with other criminals (who tend to score similarly in factor 2) and non-criminal psychopaths (who could show lower scores in the second factor); (5) factor 2 is more strongly correlated with a broad range of individuals who qualify for APD, criminal and antisocial behaviors, substance abuse, and various self-reported measures of psychopathy (Hare, 1998).

Based on a continuous dimensional construct of psychopathy (Levenson, Kiehl, & Fitzpatrick, 1995; Lilienfeld, 1998) and according to the recommendation of Walters et al. (2007) we considered the total range of scores in factor 1 and defined the cut-off points as follows: participants who scored between 0 and 6 were included in the low psychopathy groups while the ones who scored between 7 and 12 were placed in the high psychopathy groups. The distinction between high and low level of psychopathy presented in this study, using essentially a median split, has the advantage of allowing both the inclusion of all the participants and the investigation of moderate psychopaths, which is an important group that reflects the majority of the population, even if comparisons of extreme cases tend to favor statistical differences.

2.3. Facial Expressions of Emotional States from NimStim

A set of 48 faces expressing emotions, selected from the Portuguese validation of NimStim ("Development of the MacBrain Face Stimulus Set was overseen by Nim Tottenham and supported by the John D. and Catherine T. MacArthur Foundation Research Network on Early Experience and Brain Development") was used in a Go/No-go paradigm. The 48 pictures comprised eight faces for each basic emotion: happiness, disgust, fear, anger, sadness and surprise (Ekman, 1972). As a stimuli selection criterion, emotional expressions of all selected faces obtained a 60% to 70% rate of correct identification in the Portuguese normative study (Iria, Paixão, & Barbosa, 2008), ensuring comparable rates between emotional categories.

2.4. Procedure

After the ethical and control procedures, each participant was individually tested in a single experimental session that took place in a quiet and private room. The assessment consisted of a semi-structured interview intended to obtain control data, followed by the administration of PCL:SV, and concluded with the application of the emotional Go/No-Go paradigm.

The pictures showing facial expressions of emotions were administered through a notebook (14.1'' screen) running Superlab V4.0 (Cedrus Corporation, 2006) in Windows XP, and placed 1m in front of the participants.

The complete 48-picture set was presented three times (blocks), according to an experimental Go/No-Go paradigm in which participants were instructed to identify, in each block, a certain negative emotion on facial expressions - fear, sadness, or anger -

and to respond to that emotion (Go), while inhibiting responses to all other emotions (No-Go). More precisely, at the beginning of each block the participants were instructed to click as fast as possible on a predefined key (painted in red on a peripheral keypad), whenever they observed a face expressing fear (or sadness, or anger; one emotion at a time). The stimulus presentation time was 500 milliseconds (msec) with an inter-stimuli interval of 2000 msec, during which a fixation point appeared (white cross in a black background). The participants could respond during the present time stimuli or during the inter-stimuli interval. The facial expressions were randomly mixed in each block of 48 stimuli and the target emotion was counter-balanced to order the effects between subjects.

The number of omissions (Om) (errors of omission on go trials) is a measure of attention (Schulz et al., 2007). An Om was registered whenever participants did not identify the target expression, so, there is no response to a Go stimulus. The number of false-alarms (FA) (errors on no go trials) in an emotional go/no-go task not only provides a measure of behavioral inhibition but also reveal additional information concerning emotional perception (Schulz et al., 2007). An FA occurs whenever the participants mistakenly signal other emotional expressions than the target one, giving incorrect responses on a No-Go stimulus. The reaction time for false-alarms (RT) is a measure of the inhibition ability that would suppress the inappropriate or unwanted actions that could interfere with the proper skill (Mostofsky, 2003) or with the motor impulsivity. An RT is the time latency (in msec) between the stimulus display and the moment of response.

2.5 Statistical analysis

Mean and standard deviations [Mean (*SD*)] adjusted for age, educational level and intellectual abilities were computed for each group (CH, CL, NCH and NCL) for the three measures of the Go/No-go paradigm (number of omissions, number of false-alarms and reaction times in false-alarms) and compared using analysis of covariance (ANCOVA). We considered that an analysis of covariance was the most robust method to proceed with, in spite of having only 12 participants in one of the groups, since the homogeneity of variances were ensured and no serious violations of the normal distribution were detected in the histograms. Statistical significance was set at $p < .05$.

3. Results

Table 4 shows the number of false-alarms and omission for fear, sadness and anger for each group. Table 5 shows the reaction time (RT) for the FA errors for these emotions for the four groups.

In the following paragraphs we present the group effects (CH, CL, NCH, NCL) on the dependent measures (omission errors, false-alarms, reaction time to false-alarms), always co-varying with age, intellectual ability and educational level, for each emotion (fear, sadness, and anger).

Table 4

Adjusted mean and standard deviations [Adj Mean (SD)] and significance levels (identified by superscript letters) for omissions (Om) and false-alarms (FA) errors in criminals with high psychopathy (CH), criminals with low psychopathy (CL), non-criminals with high psychopathy (NCH) and non-criminals with low psychopathy (NCL) for fear, sadness and anger.

	Fear		Sadness		Anger	
Groups	Om	FA	Om	FA	Om	FA
	Adj Mean (SD)	*Adj Mean (SD)*	*Adj Mean (SD)*	*Adj Mean (SD)*	*Adj Mean (SD)*	*Adj Mean (SD)*
CH (*n*= 25)	4.14 (1.96)^{A}	11.92 (5.61)^{D}	3.50 (1.38)^{A}	8.30 (4.14)	1.51 (1.65)	9.06 (3.81)^{D,F}
CL (*n*= 37)	1.68 (1.94)	11.18 (5.56)^{E}	1.53 (1.37)^{B}	6.89 (4.17)	0.98 (1.63)	5.87 (3.78)^{E}
NCH (*n*= 12)	4.24 (2.02) ^{B,C}	11.39 (5.78)	4.23 (1.42) ^{B,C}	7.33 (5.30)	1.51 (1.70)	6.86 (3.93)
NCL (*n*=39)	1.62 (1.97)	8.09 (5.63)	1.52 (1.39)	5.44 (3.62)	1.76 (1.65)	3.72 (3.83)

The values, which are age, educational level and intellectual ability adjusted, are expressed as adjusted mean and standard deviations [Adj Mean (SD). Adjusted mean [Adj Mean] were compared using ANCOVA

Omissions: ^{A}CH compared to CL and NCL for both fear and sadness ($p < .001$); ^{B}CL compared to NCH for fear ($p < .01$) and sadness ($p < .001$); ^{C}NCH compared to NCL for fear ($p < .01$) and sadness ($p < .001$)

False-alarms: ^{D}CH compared to NCL for fear ($p < .05$) and anger ($p < .001$); ^{E}CL compared to NCL for fear and anger ($p < .05$); ^{F}CH compared to CL for anger ($p < .05$)

Table 5
Comparison of reaction time in false-alarms errors (RT) of criminals with high psychopathy (CH), criminals with low psychopathy (CL), non-criminals with high psychopathy (NCH) and non-criminals with low psychopathy (NCL) for fear, sadness and anger.

	Reaction Time (RT)		
Groups	Fear	Sadness	Anger
	Adj Mean (SD)	*Adj Mean (SD)*	*Adj Mean (SD)*
CH	936.33 (244.78) (*n*=25)	891.48 (1250.16) (*n*=25)	815.52 (264.94) (*n*=25)
CL	1106.95 (242.41) (*n*=37)	1388.05 (1237.04) (*n*=37)	976.50 (262.33) (*n*=33)
NCH	1000.43 (253.02) (*n*=11)	865.93 (1291.91) (*n*=11)	896.09 (274.45) (*n*=12)
NCL	1075.87 (245.26) (*n*=38)	1071.51 (1250.59) (*n*=37)	955.61 (284.48) (*n*=39)

The values, which are age, educational level and intellectual ability adjusted, are expressed adjusted mean and standard deviations [Adj Mean *(SD)*]

RT is expressed in milliseconds (msec)

3.1. Fear

3.1.1. Omissions

For omission errors we obtained a Group effect, $F_{(3,106)} = 14.03$, $p < .001$ (Table 4).

An unequal N HSD test showed that criminal psychopaths (CH) do not differ from their non-criminal pairs (NCH) in the number of omission errors for facial expressions of fear. However, criminal psychopaths (CH) show more omission errors than criminal non-psychopaths (CL) ($p < .001$) and non-criminal with low psychopathy (NCL) ($p < .001$). In turn, non-criminal with high psychopathy (NCH) evidenced more

omission errors than non-criminals non-psychopaths (NCL) ($p < .01$) and criminal non-psychopaths (CL) ($p < .01$).

These results indicate that the ability of psychopaths (criminals and non-criminals) to identify the facial expressions of fear is lower than that of non-psychopaths (criminals or non-criminals).

3.1.2. Number of false-alarms and reaction time for false-alarms

A Group effect for false-alarms was observed, $F_{(3,106)} = 3.11$, $p = .030$ (Table 4).

Unequal N HSD revealed that criminal groups do not differ among them (CH and CL) in the number of false-alarm errors for the facial expressions of fear, but both show more false-alarms than non-criminal non-psychopaths (NCL) ($p < .05$). There were no differences in the number of false-alarms between non-criminal groups (NCH and NCL), nor between non-criminal psychopaths (NCH) and any of the criminal groups (CH and CL).

Considering the reaction time in false-alarms, there was a small group effect, $F_{(3,104)} = 2.82$, $p = .05$, which was not confirmed by the post-hoc test (Table 5).

The results of the number of false-alarms for expressions of fear indicate that criminals (psychopaths and non-psychopaths) may have a poor skill in identifying fear and discriminating it from expressions of sadness or anger. However, the similar reaction time in false-alarms between groups suggests that the above mentioned effect is not due to poor inhibition ability in criminal groups.

3.2. Sadness

3.2.1. Omissions

A group effect was also observed for omissions in this emotion ($F_{(3,109)} = 22.30$, $p < .001$) (Table 4).

An unequal N HSD procedure showed that criminals do not differ from non-criminals within each psychopathy level (CH and NCH, CL and NCL) in the number of omission errors for facial expressions of sadness. However, criminals with high psychopathy (CH) exhibit more omission errors than those with low psychopathy, criminal (CL) ($p < .001$) and non-criminal (NCL) ($p < .001$). Similar results were obtained when non-criminal psychopaths (NCH) were compared with criminal non-psychopaths (CL) ($p < .001$) and non-criminal non-psychopaths (NCL) ($p < .001$).

These results indicate an effect of psychopathy, with both psychopath groups (criminal and non-criminal) identifying less facial expression of sadness than their non-psychopath counterparts.

3.2.1. False-alarms and reaction time for false-alarms

There was no Group effect either for the number of false-alarms ($F_{(3,109)} = 2.00$, $p = .12$) or reaction time in false-alarms ($F_{(3,103)} = 1.05$, $p = .38$) (Tables 4 and 5).

3.3. Anger

3.3.1 Omissions

There was no Group effect for omission errors ($F_{(3,106)} = 1.46$, $p = .230$) (Table 4).

These results indicate the groups did not differ in the ability to identify the facial expression of anger.

3.3.2. False-alarms and reaction time for false-alarms

There was a Group effect for false-alarm errors ($F_{(3,106)} = 10.286$, $p < .001$), but not for the reaction time ($F_{(3,97)} = 2.070$, $p = .109$) (Tables 4 and 5). In relation to false-alarm errors, Unequal N HSD tests revealed that criminals with high psychopathy (CH) display more false-alarm errors than the low psychopathic groups, criminal (CL) ($p < .05$) and non-criminal (NCL) ($p < .001$). In turn, low psychopathic criminals (CL) have more false-alarm errors than low psychopathic non-criminals (NCL) ($p < .05$). Non-criminal psychopaths (NCH) do not differ from any other group.

These results indicate that when we consider the low level of psychopathy, criminals have a poorer discrimination skill of anger from fear and sadness than non-criminals and inside the criminal condition psychopaths have poorer discrimination skills than non-psychopaths. The results of the reaction time in false-alarms suggest that the differences are not due to dissimilar inhibition abilities among groups.

4. Discussion

We measured the identification of negative emotions on facial expressions (fear, sadness and anger) through a Go/No-Go paradigm in order to study the emotional

processing of offenders and non-offenders that are either high or low in psychopathy as defined by factor 1 of PCL:SV. The number of omission and false-alarm errors for each emotion and reaction time for false-alarms were compared among four groups (high psychopathic criminals, low psychopathic criminals, non-criminals with high psychopathy and non-criminals with low psychopathy), controlled for age, educational level and intellectual ability.

Individuals with high psychopathy, independently of being criminal or not, exhibit lower ability to identify fear and sadness on facial expressions in comparison to low psychopathy groups, as shown by the higher number of omission errors. So, we may simply be observing a particular difficulty of psychopaths to properly identify fear and sadness among other negative primary emotions. The high psychopathy level appears to be associated with a specific difficulty in identifying the facial expressions of fear and sadness, which supports previous studies (Marsh & Blair, 2008), and may be independent of antisocial and criminal behavior. The current findings also give partial support to the Integrated Emotional System (IES) model of psychopathy (Blair, 2005). According to this model, facial expressions of sadness and fear may act as distress cues that, once identified, suppress the aggressive behavior in normal individuals towards their victims, but not in those with psychopathic traits, given that they seem to have a selective impairment in recognizing such emotions (Marsh & Blair, 2008). However, non-criminal psychopaths did not perform differently from criminals with the same level of psychopathy in our experiment (insofar as omission scores and reaction time in false-alarms are concerned). These results indicate that differences in criminal behavior do not differentiate performance on emotional processing tasks from participants with psychopathy.

We also observed that psychopathic criminals evidence a higher number of false-alarms in identifying facial expressions of anger than other criminal non-psychopaths (but not than non-criminal psychopaths) whereas criminal subjects, whether psychopaths or not, seem to commit more false-alarms when identifying fear. As in preceding studies (Blair et al., 2001; Hastings et al., 2008), increased false-alarms for fear may be the result of a possible confusion in participants with regard to fearful versus other facial expressions. This effect can also be interpreted as a criminal and/or psychopath-specific feature, as the experimental conditions were alike for all groups. Bearing this in mind, these results indicate that psychopaths and other criminals tend to confuse facial expressions of anger and fear with other emotions. Iria and Barbosa (2009) have attributed the increased false-alarms for fear to impulsivity patterns or response inhibition deficits, which seems to represent common neurocognitive sets in psychopaths (criminal or non-criminal) and criminals, even if non-psychopathic. However, the results presented in this study do not support this alleged hypothesis, since our data do not suggest that this accuracy deficit is attributable to impulsivity patterns. The discrepancy between our results and those obtained by Iria and Barbosa (2009) may be a consequence of different methodologies. While those authors applied two factors of PCL:SV in the recruitment of participants we applied only the factor 1 of PCL:SV. Moreover, those authors studied, as a measure of impulsivity, only the number of false-alarms whereas in our study, response-latencies were also investigated. As response-latencies of false-alarms do not differ among groups it is difficult to claim that groups with more false-alarms are more impulsive or have response inhibition deficits. Instead, they may just be showing poor discrimination skills between signal and noise trials (i.e, go and no-go trials) giving less accurate responses to the emotions under evaluation (Schulz et al., 2007). We also observed an increased number of false-alarms for anger

and fear in criminal non-psychopaths when compared with non-criminal non-psychopaths, suggesting that criminal behavior may be associated with emotional processing deficits even in the absence of psychopathy. The higher number of false-alarm errors in both psychopaths and other criminals seems to provide evidence of a defective identification process of emotional expressions by itself, thus making these individuals less skilful than receivers of this sort of information in social interactions. Thus, we can hypothesize that this increased number of false-alarms for the facial expressions of fear and anger in criminals and psychopaths shows a weakness in perceiving others' emotions, which may potentiate the violation of the rights of others and social norms. Still concerning false-alarms, the results mentioned for anger are in line with the idea that aggression can be induced by negative evaluation of others (Baron & Richardson, 2004). Munoz (2009) obtained similar results, using a different methodology. In this study, violence was related to a greater accuracy in identifying angry postures. However, that author explained that simply responding more often to "anger" among other emotional responses results in greater accuracy for this emotion, meaning fewer omissions and more false-alarms, just as we had in our go/no-go paradigm. So, in the future, it seems to be useful to include self-report measures of anger and aggressive behavior in this kind of study, in order to know if dissimilar processing of facial expressions of anger across groups is related to individual aggressive responses and, also, to the subsequent ability to channel those responses in a pro-social manner. These measures may permit the identification of eventual differences between criminal and successful psychopaths in the ability to deal with aggressive tendencies.

In conclusion, our results suggested that being a criminal and having a high level of psychopathy, may be associated to an increased misidentification of negative

emotions (fear, sadness and anger) in facial expressions. Difficulties in identifying fear and sadness in facial expressions may be a core feature of psychopathy, regardless of the absence of criminal behavior, and other criminals seem to share with psychopaths a tendency of over-responsiveness to anger and fear, even the ones who score low on psychopathy, though these last effects do not seem to be so strong. The results also highlight the importance of using four groups, three negative emotions and only the factor 1 of PCL:SV in the recruitment of participants, to better understand the nature and extension of emotional processing deficits, not only in criminal psychopaths, but also in other criminals and in psychopaths that seem able to maintain acceptable social behavior.

Extrapolations of our findings to social environments, as well as considerations regarding assessment and prevention of psychopathy should be avoided, because this research was not conducted within an applied science frame and the groups are small. Additionally, data are male-limited and positive emotions were not an object of interest in this study. Thus, in further studies, it will be interesting to investigate if these results can be generalized to females, and how groups perform regarding positive emotions. It would also be useful to do a longitudinal study in order to know if non-criminals with a high level of psychopathy will commit crimes. There are also some methodological issues that should be addressed in future studies. For example, detailed information about substance abuse (specifically the inclusion of prevalence data for each substance) and the use of measures other than self-reports to assess if this variable can provide a better control to the experiment. Moreover, it would be interesting to control the participants' mood since attention biases can influence mood congruent responses (Schultz et al., 2007).

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CAPÍTULO 6

REWARD EXPECTATION MODULATES THE IDENTIFICATION OF FACIAL EXPRESSIONS OF EMOTION IN ANTISOCIAL OFFENDERS[8]

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Resumo

Este estudo avalia os efeitos das expetativas de recompensa monetária e de custo de resposta monetário sobre o desempenho de 57 ofensores e 47 controlos numa tarefa de identificação de emoções através de expressões faciais em três condições experimentais (recompensa monetária, custo de resposta monetário, e não contingência), aplicadas aleatoriamente. Os criminosos tiveram um fraco desempenho em comparação com os controlos quando a condição é a recompensa monetária, mas não foram encontradas diferenças entre os grupos para as duas outras condições. Análises intragrupo mostram que os agressores tiveram melhor desempenho quando a sua resposta envolve um custo monetário do que quando envolve uma recompensa monetária. Estes resultados sugerem que os agressores podem ter um padrão específico orientado para a recompensa, em que a expetativa de obterem uma recompensa monetária interfere negativamente com a identificação de emoções facialmente expressas, enquanto que a expetativa de custo monetário não parece interferir com o seu desempenho. Portanto, o desempenho dos criminosos antissociais nas tarefas de identificação emocional parece ser específico da condição monetária.

Palavras-chave: agressores antissociais, recompensa monetária, recompensa, custo monetário, custo de resposta, identificação de expressões faciais.

Abstract

This study assessed the expectation effects of monetary reward and monetary response cost on the performance of 57 offenders and 47 controls in a facial emotion identification task, applying a randomized crossover design with three experimental conditions (monetary reward, monetary response cost, and no contingency). Offenders showed a poor performance compared with normal controls when the condition was monetary reward, but no differences between groups were found for the two other conditions. Within group analysis show that offenders performed better when their response involved a monetary cost than a monetary reward. These results suggest that offenders may have a specific, reward-oriented motivational pattern, in which the expectation of having a monetary reward interferes negatively with the identification of facially expressed emotions, while the expectation of monetary cost does not seem to interfere with their performance. So, the performance of antisocial offenders in emotional identification tasks seems to be monetary condition-specific.

Keywords: antisocial offenders, monetary reward, reward, monetary cost, response cost, facial expressions identification, emotion recognition.

Introduction

The spectrum of antisocial behavior, including aggression, psychopathy, behavioral problems, and antisocial personality characteristics have been under the scrutiny of scientific research for many years (Lorber, 2004). The form of antisocial behavior that does more harm to society is the criminal one. However, criminal behavior does not appear as a disorder in the Diagnostic and Statistical Manual of Mental Disorders. Instead, there are some disorders that, taken together, include a great number of people that repeatedly commit crimes (Raine, 1993). There is a high degree of comorbidity between Antisocial Disorder and Borderline Disorder (He, Cassaday, Howard, Khalifa, & Bonardi, 2011) and, in some case these two disorders, are related with the construct of Psychopathy (Hare, 1991). There is a considerably heterogeneity among criminal individuals, as within many established behavioral disorders. However, it is well it is well established that a monetary gain often motivates the committing of crimes (Baker & Piquero, 2010) and a sensitivity to rewards is a higher motivator for the committing of crimes than the sensitivity to punishment in preventing it (Castellà & Perez, 2004). Nevertheless, among criminals only a few individuals commit crimes repeatedly among criminals, even after successive convictions, thus exhibiting a predisposition to antisocial behavior regardless of any diagnosed personality disorders. The small minority of criminals that commit crimes more that once time seems to have in common an intrinsic predisposition to general antisocial behavior compared to one-time criminals, whose antisocial behavior may be more situation specific (Raine, 1993).

One possible explanation is the association of this persistent antisocial behavior with deficits in processing and responding to emotional cues in the social environment

(Sterzer, Stadler, Krebs, Kleinschmidt, & Poutska, 2005). Facial expressions play a particularly important role in emotion processing (Saarni, Campos, Camras, & Witherington, 2008). In reality, an impairment in the identification of emotional facial expressions can lead to social failure and criminal behavior (Dodge, Laird, Lochman, & Zelli, 2002; Howner et al., 2011)**.** In fact, deficits in recognizing facial expressions of emotions were found in studies performed with antisocial populations in general, including people with aggressive behavior, unspecified criminals, delinquents, externalizing individuals (Marsh & Blair, 2008), prisoners (Robinson et al., 2012), and in the personality disorders closely associated to criminality, such as, Antisocial Personality Disorder (Dawel, O'Kearney, McKone & Palermo, 2012,Dolan & Fullam, 2006; Marsh & Blair, 2008), Psychopathy (Dolan & Fullam, 2006; Hastings, Tangney, & Stuewig, 2008; Marsh & Blair, 2008; Wilson, Juodis, & Porter, 2011) or Borderline Personality Disorder (Robin et al., 2012).

However, some studies have been unable to demonstrate this deficit associated to antisocial behavior in a broader spectrum of populations. For example, a recent study has shown that the sensory processing of facial stimuli is functionally intact in individuals with antisocial tendencies recruited from the community (Pfabigan, Alexopoulos, & Sailer, 2012). Another study demonstrated that psychopathic prisoners perceive the intensity of facial expressions in general and more particularly, fearful faces (Book, Quinsey, & Langford, 2007), even better than controls. Other studies have shown that psychopaths recognize facial expressions just as well as controls (Glass, & Newman, 2006; Kosson, Suchy, Mayer, & Libby, 2002). Bearing these conflicting findings in mind, the deficits in recognizing facial expressions of emotion in antisocial people may be task condition specific. To test this thesis we decided to start by evaluating the effect

of monetary contingency conditions on the performance of antisocial offenders in a conventional emotion recognition task.

We predicted that antisocial people would perform better with the expectation of a monetary reward, less well with a response cost expectation condition, and worse under a no-contingency condition. We also predicted that they would perform as well as controls under the two first conditions. Our predictions were based not only on the material motivation of antisocial people, but also on previous studies that have shown that antisocial personality traits are linked to a greater brain activation by rewards, thus suggesting a hypersensitivity to rewards (Buckholtz et al., 2010).Therefore, this research compares recidivistic offenders with community controls - age, intellectual ability, and sex-matched - in three tasks of facial expression recognition using pictures from the NimStim Data Set (Tottenham et al., 2009), with different instructions involving expectations of monetary contingencies (No Contingency, Monetary Reward and Response Cost). The main purpose was to test whether their performance in identifying basic emotions in facial expressions could be modulated by expectations of monetary reward/cost, thus contributing to a greater understanding of the conflicting findings from previous studies.

Materials and Methods

Participants and selection procedure

One hundred and four adult males participated in this study, of which 57 were antisocial criminals (Offender Group – OG), and 47 community controls (Control Group – CG). All participants were recruited by advertising in four cities in the central

region of Portugal. The offenders were recruited in associations providing support to ex-prisoners while the community controls were recruited by advertising in different institutions, such as social, cultural, and sports associations. All participants provided a written informed consent, and were paid 30€ for their participation, which comprised of six experimental tasks, including the one analyzed in this study. All accepted to take part in the experiment and none quit during the tasks. As general inclusion criteria, participants had to be male, between 20 and 65 years old, and have been drug, alcohol or medication free for at least 6 months. Exclusion criteria for participants were the following: having an Intellectual Ability score (IA) < 12, as assessed using a shortened version of Raven's Matrices, standardized to the Portuguese population (Amaral, 1966); a history of neurological or psychiatric problems; significant sensory or motor impairments; and the present use of drugs, alcohol, or medication (screened by a semi-structured interview conducted by a senior clinical psychologist).

Offender participants in particular had to have two or more effective convictions to prison and meet the criteria for diagnosis of Antisocial Personality Disorder, according to DSM-IV-TR (American Psychiatric Association, 2000). Participants recruited for the control group reported never having broken the law, and, the criminal records of all participants were checked after due authorization. None of participants of the control group were excluded. Conversely, seven participants were excluded previously from the ones recruited for the offender group, due to psychiatric and/or neurologic impairments. Offender group and control groups were matched by gender (all male), age, education and intellectual ability (Table 1), but not in past dependency or serious abuse of alcohol or drugs. For this reason this variable was included in the analysis as explained below.

Table 1
Demographic characteristics

	OG (*n*=57)	CG (*n*=47)	*t-value/* $\chi 2$	*p* value
Age	39.75 (9.65)	37.83 (10.72)	.96	> .05
Intellectual Ability	15.67 (3.68)	16.17 (4.30)	-.64	> .05
Education (years)	7.42 (2.72)	7.79 (2.89)	-.67	< .05
Criminal typology	26 Pp; 34 Pt; 13 St; 31 Dg			
Number of conviction	2.72 (.98)			
Years of imprisonment	7.41 (4.33)			
Past alcohol or drugs addiction	43	8	24.02	< .05

OG, offender group; CG, control group; n, number of participants; Pp, crimes against people (murder, grievous bodily harm, domestic violence, kidnapping, illegal restraint, rape, trafficking of human beings); Pt, crimes against patrimony (theft, organized or armed robbery, swindling, racketeering and extortion, handling stolen goods); St, crimes against society (forgery of administrative documents, counterfeiting of currency, forgery of means of payment, arson); Dg, illicit trafficking in narcotic drugs and psychotropic substances. All data show mean values (± *SD*) or number of cases.

Materials

Thirty-six pictures from the Portuguese validation of the NimStim Data Set (Tottenham et al., 2009) were used. The selected pictures were comprised of color photographs on a white background showing male and female actors expressing the six basic emotions (Ekman, 1972): happiness, disgust, fear, anger, sadness and surprise (six photographs per emotional category). The selected pictures had already obtained 50% to 60% correct identifications in the Portuguese normative study (Iria, Paixão, & Barbosa, 2008), as a means to control the difficulty of the task between emotional categories.

Procedure

The experimental task was completed in a single session. Each participant was tested individually in a quiet and private room. The pictures were administered through a notebook (14.1'' screen) placed 1m in front of the participants, running Superlab V4.0 (2008, Cedrus corp., San Pedro, USA). Each picture was presented once for 10 sec with an equal inter stimuli interval (ISI), during which a fixation point was displayed. The participants had a peripheral keypad with a key for each of the six basic emotions, and were instructed to click on the key where the corresponding emotion was written, as fast as they could. The photographs were presented sequentially, without any kind of feedback.

Under the *reward* condition, participants earned 0.50€ for every emotion correctly identified, and could totalize an amount of 6€ at the end of the block. Under the *response cost* condition, 6€ were distributed to the participants at the beginning of the block, and 0.50€ were removed from that amount for each emotion incorrectly identified. Under the *no contingency* condition, no money was used. The three experimental conditions (reward, response cost, no contingency scheme) were randomly presented in blocks, and 12 equivalent pictures of facial expressions of emotions (2 pictures for each emotion) were shown per condition. The pictures under each condition were also randomized.

All subjects received detailed instructions about the experimental conditions at the beginning of the task. The instructions were "Your task is to identify the emotion that each person is feeling in each photo and click the corresponding button as quickly as possible. You are offered 0.50€ for each correct answer. At the end of the series you can see how many answers were correct and will be shown the amount that could be

added to your total" for the reward condition. For the response cost condition, they were instructed: "Your task is to identify the emotion that each person is feeling in each photo and click the corresponding button as quickly as possible. Before you start you are offered a personal account with 6€. For every incorrect answer 0.50€ will be subtracted from your personal account. At the end of the series you can see how many wrong answers you had and you will get the amount that remains. Note that if all your answers are wrong, your personal account will return to 0.00€." Finally, for the no contingency condition the instruction was: "Your task is to identify the emotion that each person is feeling in each photo and click the corresponding button as quickly as possible."

Data Analysis

We conducted repeated ANOVA measurements with *experimental condition* (reward, response cost, and no contingency) serving as a within-subjects factor, and *group* (Offenders and Controls) as a between-subjects factor. Also, the variable "dependency or serious abuse of alcohol or drugs" was included as a between-subjects factor since there was an unequal number of participants in the two groups reporting such dependency, and previous studies had related this variable to emotional identification deficits (Serrano, Lozano, Garcia, & Garcia, 2010).

Three measures - Number of errors (Errors), reaction time for all responses (GRT), and reaction time for errors (ERT) – were independently analyzed and a post-hoc Newman-Keuls test was applied for the analyses of specific effects. Normality and homogeneity assumptions were verified in all cases. All analyses were performed using the software Statistica, version 8.0 (2008, StatSoft Inc., Tulsa, USA).

Results

Mean and standard deviations for the three measures were computed for the two groups and the three experimental conditions: number of errors (Errors), reaction time for all responses (GRT) and reaction time for errors (ERT) are shown in Table 2. In the following paragraphs, both the main and interactive effects of the group and experimental conditions for the above-mentioned measures are presented.

Number of Errors

Considering the number of errors (misidentified emotions), our results show that there is no main effect for *Group* $F(1,100) = 2.04$, $p > .05$, nor for *Experimental Condition*, $F(2,200) = 2.04$, $p > .05$. However, ANOVA yielded an effect for the interaction *Group*Experimental condition*, $F(2,200) = 3.37$, $p = .036$.

Post-hoc analyses (Newman-Keuls test) show no within group effects for controls, while offenders had more errors under the reward condition than under the response cost ($p < .001$) and no-contingency condition ($p < .05$). Finally, between group analyses show that offenders had more errors than controls under the reward condition ($p < .01$), but no between group differences were observed for the response cost or no-contingency conditions. See Table 2.

Table 2

Mean (M) and standard errors (SE) for Number of Errors, General Reaction Time and Error Reaction Time of the offender group (OG) and control group (CG) in the Reward Condition, Response Cost Condition and No Contingency Condition

	Reward Condition		Response Cost Condition		No Contingency Condition	
Measures	OG (*n*=57)	CG (*n*=47)	OG (*n*=57)	CG (*n*=47)	OG (*n*=57)	CG (*n*=47)
	M (SE)	*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*
Number of Errors	3.69 (.24) ***ΔΔ$	2.60 (.30)	2.60 (.29) ß	2.74 (.37)	3.09 (.34)	2.62 (.42)
GRT (mls)	3860.13 (136.69)	3818.89 (172.41)	3807.44 (141.55)	3716.55 (178.55)	3850.17 (156.01)	3702.30 (196.78)
ERT (mls)	4895.78 (245.84)	5197.76 (310.55)	5349.40 (277.10)	4598.08 (350.05)	4936.80 (263.72)	4686.27 (333.14)

OG = Offender group; CG = control group; GRT = General Reaction Time; ERT = Errors Reaction Time; msec = millisecond; ***, $p < .001$ when the number of errors of the offender group under the Reward condition is compared with number of errors of the offender group under the Response Cost condition; ΔΔ, $p < .01$ when the number of errors of the offender group under the Reward condition is compared with the number of errors of the control group under the Reward condition; $, $p < .05$ when the number of errors of the offender group under the Reward condition is compared with the number of errors of the control group under the Response Cost and No Contingency conditions; ß, $p < .05$ when the number of errors of the offender group under the Response Cost condition is compared with the number of errors of the offender group under the No Contingency condition)

General Reaction Time

ANOVA yielded no main or interaction effects (all $F < 1$, $p > .05$).

Reaction Time for Errors

ANOVA yielded no main or interaction effects (all $F < 1$, $p > .05$).

Dependency or serious abuse of alcohol or drugs

As stated above, the group of offenders and non-criminals were not equivalent in relation to the variable *Dependency or serious abuse of alcohol or drugs* (meaning, self-reported history of drug/alcohol abuse for a minimum period of six consecutive months). For this reason we decided to explore the effects of this variable. No main effects of such factor were detected for Number of Errors, $F(1,100) = .81$, $p > .05$, General Reaction Time $F(1, 100) = 1.33$, $p > .05$; Reaction Time Errors $F(1,100) = .1.00$, $p > .05$). Also, we found no statistically significant relation for *Dependency or serious abuse of alcohol or drugs*Group*Experimental conditions (*all $F < 1$, $p > 0.5$).

Discussion

The literature provides conflicting data on the ability of antisocial populations to recognize facial expressions of emotion. Possibly, their performance is interfered by task-related variables. In this study we tested whether the performance of antisocial offenders in a task of identification of facial expressions of emotions is modulated by different instructions of monetary contingency conditions - reward, response cost and no contingencies. Contrary to our expectations, offenders performed worse under the monetary reward condition than under the monetary cost or no-contingency conditions and under this last condition performed as well as the controls. However, as initially predicted, they performed as well as the controls under the response cost condition. This study suggests that the deficit in the recognition of facially expressed emotions by antisocial people may be related to the conditions of the task. Specifically, the expectation of monetary reward seems to interfere negatively in their performance. It seems to be the factor of a reward, and not the monetary value, which explains this

effect, as the same monetary value was given in the response cost condition and their performance improved significantly. Also, the expectation of getting monetary rewards did not interfere with their cognitive control or, in other words, make them choose more impulsively, because the antisocial offenders and controls did not differ significantly considering Error Reaction Time (ERT) or General Reaction times (GRT) under any of the conditions. One possible explanation, consistent with the reward-orientation thesis, is that the expectation of having material rewards shifted the antisocial people's attention to the reward system, negatively interfering with the identification of facial expressions. In fact, it is already known that a greater activation of the reward areas of the brain is associated with certain antisocial traits, suggesting a hypersensitivity to rewards (Oberlin et al., 2012), while community controls are not influenced by this trend, hence displaying an equivalent number of errors under the different experimental conditions. The worst results of the antisocial group may be explained if we take the study of Lu et al. (2013) into account, where it was suggested that the instruction of a reward could implicitly distract attention. Thus, if the reward itself becomes a primary target of the antisocial offender's attention, the processing of other information is affected. On the contrary, when antisocial people already have the full monetary reward in their possession at the beginning of the task, their hypersensitivity to reward does not distract them from the experimental task, and they are able to perform as well as the controls. In addition, this study did not find differences between the antisocial group and the controls under the no contingency condition, in line with previous studies with different groups from the antisocial spectrum (Book, et al., 2007; Glass, & Newman, 2006; Kosson, et al., 2002 Minzenberg, Poole, & Vinogradov, 2006). So, our results did not support either the findings of Robinson et al. (2012) suggesting a deficit in the ability to recognize emotions in prisoners, or the findings of other studies performed with other

antisocial populations in which the deficit in the ability to recognize emotions was only observed for specific emotional categories (Dolan & Fullam, 2006; Iria & Barbosa, 2009; Iria, Barbosa, & Paixão, 2012; Marsh & Blair, 2008).

The present study has some limitations. The number of participants and stimuli do not allow us to take into consideration specific emotional categories, criminal typologies and specificities of personality disorders that are included in antisocial behavior, and specific emotional categories into consideration. Also, the introduction of other impulsivity measures, in addition to reaction times, is a goal to pursue in future research. These preliminary results are useful nevertheless.

In summary, our findings provide evidence suggesting that antisocial individuals' ability to recognize facial expressions of emotions can be interfered with by monetary task contingencies, whereas this ability in controls is not, which could help explain some conflicting findings. Previous research suggests that the sensitivity to reward may be a useful personality trait to distinguish offenders from non-offenders and even between offenders (Leue, Brocke, & Hoyer, 2008), and our data support that thesis. To conclude, we may also hypothesize that antisocial individuals' performance in emotional identification tasks depends on specific experimental conditions that may modulate their behavior differently from the controls.

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CAPÍTULO 7

IDENTIFICATION OF EMOTIONS IN ANTISOCIAL OFFENDERS: AUTONOMIC AND COGNITIVE PROCESSING [9]

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Resumo

Um grupo de ofensores antissociais e um grupo controlo identificaram emoções através de expressões faciais em três condições: recompensa material, custo de resposta material e sem contingências para explorar efeitos de défices de ofensores comummente reportados nestas tarefas. A resposta da condutância da pele (SCR) avaliou a ativação emocional.

Os criminosos antissociais tiveram um desempenho pior do que os controlos nas condições de recompensa e sem contingências, mas na condição de custo de resposta os resultados foram semelhantes. Os ofensores antissociais apresentaram maior SCR do que os controlos nas duas condições monetárias.

Os resultados sugerem que os criminosos antissociais são hipersensíveis às contingências materiais; a recompensa material parece interferir negativamente no desempenho enquanto o custo de resposta melhora-o. O nível de ativação não parece explicar a capacidade de identificar as emoções facialmente expressas. Os resultados sugerem que as variações metodológicas poderão explicar os resultados contraditórios na literatura.

Palavras-chave: criminosos antissociais, identificação de expressões faciais, resposta da condutância da pele, atividade eletrodérmica, recompensa material.

Abstract

A group of antisocial offenders and a control group identified facial expressions of emotion under three conditions: monetary reward, monetary response cost, and no contingency, to explore effects on the antisocial offenders' deficits commonly reported in these tasks. Skin Conductance Responses (SCR) indexed emotional arousal.

Antisocial offenders performed worse and displayed higher SCR than controls under reward and no contingency conditions, but in the response-cost condition results were similar. The antisocial offenders presented higher SCR than controls in the two monetary conditions.

These findings suggest that antisocial offenders are hypersensitive to monetary contingencies; monetary reward seems to interfere negatively in their performance while monetary response cost improves it. Arousal level seems unable to explain ability to identify facial affects, while results suggest that methodological variations may explain the conflicting results in the literature.

Keywords: antisocial offenders, facial affect recognition, skin conductance response, electrodermal activity, monetary reward.

Introduction

Since deficits in the identification of emotions could be related to failures in social competence and the genesis of criminal behaviour (Blair, Peschardt, Budhani, Mitchell, & Pine, 2006; Dodge, Laird, Lochman, & Zelli, 2002; Howner et al., 2011; van Goozen, Fairchild, Snoek, & Harold, 2007), psychobiologic models have proposed differences in the ability to identify facial expressions in offenders and non-offenders (Dolan & Fullam, 2006; Marsh & Blair, 2008). In fact, the ability to identify facially expressed emotions seems to be associated to individual or group specificities (Iria & Barbosa, 2009) and antisocial populations (psychopaths, borderlines, criminal recidivists, those suffering from behavioural disorders) frequently exhibit deficits in identifying facial expressions, especially negative expressions, such as fear and anger (Marsh & Blair, 2008).

Nevertheless, some studies have been unable to demonstrate this deficit (Book, Quinsey, & Langford, 2007; Glass, & Newman, 2006; Pfabigan, Alexopoulos, & Sailer, 2012). More recently Iria, Barbosa and Paixão (submitted) have found that antisocial offenders could perform as well as controls under experimental conditions where monetary response cost was expected or no contingencies were applied, but not when rewards were in play, suggesting that antisocial offenders seem to have a negative hypersensitivity to monetary reward that may interfere with their ability to recognise emotions. However the majority of these studies has only been focused on the cognitive facet of this deficit, simply measuring the ability to perceive the emotional state of others via emotion recognition tasks, using facial expressions (Bons, Scheepers, Rommelse, & Buitelaar, 2010). It is also necessary to study the processing of facial expressions at the emotional level, evaluating the experience of emotions consistent with, and in response to, those of others by the autonomic response to emotional facial expressions (Bons et al., 2010). On the one hand, research on emotion has shown that autonomic responses, among other measures, can offer reliable indices about

emotional reactions (Khalfa, Peretz, Blondin, & Manon, 2002). Skin Conductance Response (SCR) is an autonomic index directly under the control of the sympathetic system (Dawson, Schell, & Filion, 2000) that passes a low current through the skin using a bipolar placement of electrodes (Mendes, 2008). This allows us to measure rapid modifications in the sweating activity of the skin, due to the activity of the sweat glands, which results from the cholinergic stimulation of the sympathetic neurons (Khalfa et al., 2002).

Facial expressions induce emotional responses in individuals (Marsh, Ambady, & Kleck, 2005), including autonomic arousal (Blair & Cipolotti, 2000) that can be indexed through skin conductance. Moreover, low autonomic nervous system activity is known as a biomarker for aggressive and antisocial behaviour (Baker, Shelton, Baibazarova, Hay, & van Goozen, 2013). In fact, a hyporeactive autonomic system regarding emotive material (including facial expressions) may compromise successful social and emotional processing, contributing to a failure in social behaviour (Heims, Critchley, Dolan, Mathias, & Cipolotti, 2004). Nevertheless, contradictory data has been found in specific offender samples, for example, suggesting a physiological hyper-reactivity in those who physically abuse children (McCanne & Hagstrom, 1996). Recently a medical imaging study also found contradictory data suggesting that offenders have enhanced neural processing of fearful faces in the amygdala as well as in other facial processing brain areas, compared to controls (Howner et al., 2011). Raine (2005) suggested that the low autonomic response is linked to social conditions and mostly characterises antisocial offenders of a high social economic status.

Bearing this conflicting data in mind, it is important to further explore which conditions may modulate the deficit that antisocial offenders seem to show in processing the facial expressions of emotion. Blair and Frith (2000) have proposed that social surroundings influence the motivation to commit crimes, if there is no motivation to go against the law, then this deficit in the socialization process will not reveal itself. On the other hand, it is well

established that monetary gain often motivates the committing of crimes (Baker & Piquero, 2010) and the sensitivity to rewards is a higher encourager for the committing of crimes than the sensitivity to punishment in preventing it (Castellà & Perez, 2004).

To test this thesis we assessed the performance and the arousal of antisocial offenders and controls in experimental tasks of identification of facial expressions of emotion using three contingencies: monetary reward, response cost and no contingency. Thus, a poorer accuracy of antisocial participants regarding the identification of emotions in the reward condition was expected, both in comparison with other conditions and controls. It was also hypothesised that antisocial offenders would show higher physiological response under this condition, as a manifestation of their hypersensitivity to monetary reward.

Methods

Participants

Eighty-one adult males were recruited by advertising in four cities in the central region of Portugal and participated in this study. Forty-one were antisocial offenders (Antisocial Group – AG), and forty participants comprised the control group (Control Group – CG). However, due to technical problems the physiological data of three antisocial participants and four control participants were not recorded (AG n = 38; CG n = 36). As general inclusion criteria, participants had to be male, and between 20 and 65 years old. Antisocial participants in particular, had to have two or more convictions leading to prison and meet the criteria for Antisocial Personality Disorder (ASPD), as defined by the 4th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2000). Participants recruited for the control group stated that they had never engaged in law-breaking behaviour and the criminal records of all participants were checked after due authorization.

Exclusion criteria were: a history of neurological or psychiatric problems, significant sensory or motor impairments, consumption of drugs or alcohol in the last six months, or the use of medication that could interfere with the results, and the consumption of coffee or cigarettes three hours before the experiment. Exclusion criteria were screened by a semi-structured interview, conducted by a senior clinical psychologist.

The two groups were statistically matched in relation to: age, $t(72) = .62$, $p = .18$ ($M_{AG} = 39.05$, $SD_{AG} = 9.38$; $M_{CG} = 37.64$, $SD_{CG} = 11.53$), the number of years of education, $t(72) = -.95$, $p = .68$ ($M_{AG} = 7.63$, $SD_{AG} = 2.95$; $M_{CG} = 8.25$, $SD_{CG} = 3.14$), and intellectual ability, $t(72) = -.10$, $p = .92$ ($M_{AG} = 16.12$, $SD_{AG} = 3.66$; $M_{CG} = 16.21$, $SD_{CG} = 3.46$) as assessed by the IA test (shortened version of Raven's Matrices, standardized to the Portuguese population by Amaral, 1966). All had a low socio-economic status, also assessed during the interview.

All participants accepted to take part in the experiment (none was excluded) and provided written informed consent.

Materials

NimStim Data Set. Thirty-six pictures from the Portuguese validation of NimStim (NimStim-PT) (Iria, Paixão, & Barbosa, 2008) were used. The selected pictures comprised colour photographs on a white background showing male and female actors expressing the six basic emotions (Ekman, 1972): Happiness, Sadness, Anger, Fear, Surprise, and Disgust (six photographs per emotional category). Only pictures with 50% to 60% of correct identification in the Portuguese normative study (Iria et al., 2008) were selected, as a means to control the difficulty of the task between emotional categories.

Psychophysiological device. A computerized polygraph system, model I-330-C2 from JJ Engineering (Poulsbo, Washington) was used to record the psychophysiological data.

Procedure

Participants were shown a set of facial expressions of emotions while monitoring the skin conductivity under three different monetary contingencies – reward, response cost, no contingency.

The pictures were administered on a notebook (14.1'' screen) placed 1m in front of the participants, running Superlab V4.0 (2008, Cedrus corp., San Pedro, USA). Data were collected in a laboratory room with controlled temperature (20-25º C). All telephones and others electrical devices were turned off during the electrodermal recordings. Each picture was presented once for 10 sec with an equal inter stimuli interval (ISI) of 10 seconds, during which a fixation point was displayed. Participants had a peripheral keypad with a key for each of the six basic emotions, and were instructed to click on the key where the corresponding emotion was written, as fast as they could. The photographs were presented sequentially, without any kind of feedback. The three experimental conditions (reward, response cost, no contingency scheme) were randomly presented in blocks, and 12 equivalent pictures of facial expressions of the emotions (2 pictures for each emotion) were shown per condition. The pictures in each condition were also randomized. Under the *reward* condition, participants earned € 0.50 for every emotion correctly identified, and could totalize an amount of € 6.00 at the end of the block. Under the *response cost* condition, € 6.00 were distributed to the participants at the beginning of the block, and € 0.50 was removed from that amount for each emotion incorrectly identified. Under the *no contingency* condition, no money was used.

All subjects received detailed instructions about the experimental conditions at the beginning of the task. The instruction for the reward condition was: "Your task is to identify the emotion that each person is feeling in each photo and click the corresponding button as quickly as possible. You will receive € 0.50 for each correct answer. At the end of the series you can see how many correct answers you had and the corresponding amount you have won". For the response cost condition: "Your task is to identify the emotion that each person is feeling in each photo and click the corresponding button as quickly as possible. Before you start you are offered a personal account with € 6.00. For every incorrect answer € 0.50 will be subtracted from your personal account. At the end of the series you can see how many wrong answers you had and you will get the amount that remains. Notice that if all the answers are wrong, your personal account will be € 0.00". For the no contingency condition: "Your task is to identify the emotion that each person is feeling in each photo and click the corresponding button as quickly as possible".

Psychophysiological Protocol (Skin Conductance). Skin conductance electrodes were attached to the distal phalanges of the index and middle fingers of the non-dominant hand, allowing participants to use their dominant hand to press the keypad. The EDA amplifier was connected to a laptop computer running Physiolab USE3 software (by JJ engineering, Poulsbo, WA) in Windows XP, which was used for the electrodermal recordings. The I-330 system contained a built in optical interface to prevent electrical hazards. After the electrodes had been attached, the participant sat in a resting state for four minutes in order to record the tonic level. Immediately after this initial period, participants performed the facial expression recognition task under the three above mentioned conditions.

Skin conductance was measured throughout the experiment using a lowpass filter of 5Hz to remove high frequency noise. Data were collected for 12 minutes after which recording was terminated and the electrodes were removed. The data collected were then stored and recalled for later analysis by means of functions created in Excel. We used a phasic analysis instead a tonic analysis because we were interested in the autonomic responses in a temporal window of 1 to 10 sec after the presentation of the stimulus (Boucsein, 1992). The area under the curve (AUC) in that temporal window was the measure we selected for the phasic analysis. As AUC includes both the response amplitude and the rising/declining time, other researchers suggest that this composite measure may be more effective than any of those parameters alone (Boucsein, 1992; Naqvi & Bechara, 2006) and is more suitable for automatic analysis (Figner & Murphy, in press). We computed the AUC using the trapezoidal rule for the standardized results and we chose a larger than usual temporal window after the stimulus onset, so as to insure the inclusion of the time delay of the response (usually less than or equal to three seconds), the rising time (usually one to three seconds, Boucsein et al., 2012) and the period of decline.

The formula utilised was: area = h / 2 (y1 +2 * sum (y2.. yn-1) + yn) where *h* is the space between points, and y1 ... yn all the points considered (where 1 and n indicate the first and last points, respectively). This area is divided by the duration of the time window in seconds, resulting in µS/seg units.

Statistical analysis

Repeated ANOVA measures were computed with *Experimental conditions* (Reward condition, Response Cost condition, No Contingency condition) serving as a within-subjects factor, and *Group* (Antisocial offenders, Controls) as a between-subjects factor. Post-hoc Newman-Keuls test was applied for the analyses of specific effects. Normality and homogeneity assumptions were verified in all cases. Behavioural and physiological data were independently analysed. The physiological measures were the Mean AUC. The behavioural measure was the total Number of Errors and the Reaction Time that is, the time delay (in seconds) between the stimulus display and the moment of response. All analyses were performed using the software Statistica, version 8.0 (2008, StatSoft Inc., Tulsa, USA).

Results

Number of errors and Reaction Time

Mean and standard errors were computed for the two groups (Antisocial Group and Control Group) for the total number of errors and for the reaction time. Results can be seen in Table 1.

Table 1
Mean (M) and standard errors (SE) for Number of Errors and for Reaction Time (in seconds) of the Antisocial group (AG) and Control group (CG) in the Reward Condition, Response Cost Condition and No Contingency Condition

	Reward Condition		Response Cost Condition		No Contingency Condition	
Measures	AG (*n*=41) *M (SE)*	CC (*n*=40) *M (SE)*	AG (*n*=41) *M (SE)*	CC (*n*=40) *M (SE)*	AG (*n*=41) *M (SE)*	CC (*n*=40) *M (SE)*
Total Number of Errors	3.32 (.22)	2.25 (.22)	2.22 (.26)	2.38 (.27)	3.17 (.29)	2.30 (.29)
Reaction Time (RT) (in seconds)	3.83 (1.39)	3.67 (1.41)	3.75 (1.42)	3.54 (1.44)	3.88 (1.50)	3.45 (1.42)

In respect to the total number of errors and taking all the emotions together there is a main effect for *Group*, $F(1,78) = 4.59$, $p = .04$, with antisocial offenders committing

more errors (M = 2.91, SE = .20) than controls (M = 2.31, SE = .20). Also, there is a main effect for *Experimental Condition*, $F(2,156) = 3.29$, $p = .04$. Post-hoc analyses show that the participants committed more errors under the No Contingency condition (M = 2.73, SE = .21, $p < .05$) and Reward condition (M = 2.80, SE = .16, $p < .01$) than under the Response Cost condition (M = 2.30, SE = .19). There is also an effect within *Experimental condition*Group*, $F(2,158) = 4.96$, $p < .01$. Post-hoc analyses show that antisocial offenders commit more errors under the Reward condition ($p < .01$) and No Contingency condition ($p < .05$) than under the Response Cost condition, while no within group effect was found in controls. Finally, between-group analyses show that the antisocial group commits more errors under the Reward condition than the controls under any of the three experimental conditions (all $p < .05$). Also, the antisocial group under the No Contingency condition performs worse than the controls under the Response Cost condition ($p < .05$), in spite of the fact that the difference in the performance compared with controls under the Reward and No Contingency conditions is marginal, not significant ($p = .07$ and $p = .06$, respectively).

In relation to the Reaction Time, taking all the emotions together there is no main effect for *Group*, $F(1,79) = 1.95$, $p = .17$ with the antisocial group (M = 3.82, SE = 1.32) exhibiting a similar reaction time to the controls (M = 3.56, SE = 1.34), for *Experimental conditions* $F(2,158) = 1.34$, $p = .27$, the Reward condition (M = 3.75, SE = .99), Response Cost condition (M = 3.65, SE = 1.01) and No Contingency condition (M = 3.66, SE = 1.07) all have similar time delays in the response time. There is no effect for the interaction *Group*Experimental conditions*, $F(2,158) = 2.10$, $p = .13$.

Mean Magnitude of Skin Conductance Response

Mean Magnitude of SCR in Reward, Response Cost and No Contingency was computed for the antisocial group (AG) and the control group (CG) considering all the emotions together (Happiness, Sadness, Anger, Fear, Disgust and Surprise). Results may be seen in Table 2.

Table 2
Mean and Standard Error [M (SE)] of SCR´s (Area Under the Curve - AUC) in Reward, Response Cost and No Contingency for Antisocial Group (AG) and Control Group (CG) considering all emotions together (Happiness, Sadness, Anger, Fear, Disgust and Surprise)

	Reward Condition		Response Cost Condition		No Contingency Condition	
	AG	CG	AG	CG	AG	CG
Measures	(*n*=38)	(*n*=36)	(*n*=38)	(*n*=36)	(*n*=38)	(*n*=36)
	M (SE)	*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*
SCR's Mean AUC (*μS/s)*	3.30 (.25)	2.02 (.26)	3.21 (.24)	2.06 (.24)	2.57 (.23)	1.92 (.23)

Mean Magnitude of SCR

Taking into consideration the results of all the emotions together, we found a main effect for *Group*, $F(1,72) = 9.95$, $p < .01$, where the mean magnitude of SCR in antisocial offenders ($M = 3.03$; $SE = .23$) was higher than in controls ($M = 2.00$; $SE = .23$). Also, there is a main effect for *Experimental conditions*, $F(2,144) = 12.70$, $p < .001$. Post-hoc tests show that the mean magnitude of SCR under No Contingency condition ($M = 2.25$; $SE = .16$) is lower than under the Reward ($M = 2.66$; $SE = .18$, $p <$

.001) and Response Cost (M = 2.64, SE = .17, p < .001) conditions. There is also an effect for the interaction *Experimental Conditions*Group,* $F(2,144) = 6.73$, $p < .01$. Post-hoc tests clarified that the mean magnitude of SCR in antisocial offenders is lower the No Contingency condition when compared with the Reward and Response Cost conditions ($p < .001$), while the controls' SCR does not seem to be affected by any of the conditions (all $p > .05$). The mean magnitude of SCR of antisocial offenders under the Reward condition ($p < .01$) and the Response Cost condition ($p < .01$) are higher than for the controls under the three conditions.

Discussion

In this study we compared the performance and the physiological response (skin conductance) of antisocial offenders with controls in a task of identifying basic emotions through facial expression under three experimental conditions: monetary reward, monetary response cost, and no contingencies in order to know if the monetary contingency modulated the results. We hypothesized that antisocial offenders show hypersensitivity to rewards and that the expectation of getting them negatively interferes with their performance while identifying emotions from facial expressions. This supports the idea that antisocial offenders may have a hypersensitivity to reward (Bjork, Chen, Smith, & Hommer, 2010; Buckholtz et al., 2010), in some cases with a negative effect (Iria et al., *in press*) and provides some explanation for the ambiguous results from previous research on antisocial individuals.

However, these results only partially confirmed our hypothesis, because, in this study, the antisocial offenders exhibited a poorer accuracy rate for facial expressions under the Reward condition compared with the controls, but they performed equally

badly when there were No Contingencies modulating their responses at the intragroup level. In the same way, they performed equally badly, when there were No Contingencies modulating their responses, compared with the controls under the Response Cost condition. In addition, the possibility of losing money increased the accuracy of the antisocial offenders when identifying emotions and raised them to the same level of the controls. Simultaneously, the Reward and Response Cost conditions induced similarly higher levels of arousal in the antisocial offenders, as indexed by SCR, when compared to the No Contingency condition and to the Controls under the three conditions. On the other hand, the magnitude of the SCR of the antisocial offenders under the No Contingency condition could not be distinguished from the magnitude of the controls' SCR under the three experimental conditions. These results seem to indicate that the antisocial offenders were more sensitive to monetary contingencies than the controls and that monetary contingencies lead to a higher arousal in the antisocial offenders.

It is possible to consider these results from the point of view of Yerkes-Dodson's law (Yerkes & Dodson, 1908) that relates performance to arousal, which takes performance as an inverse U-shaped function of the arousal level. The unsuccessful performance of under-aroused people is explained in motivational terms, while the performance of over-aroused people is understood in terms of Easterbrook's hypothesis, this is: in high arousal, attention tends to be concentrated on the dominant and most obvious aspects of the situation. Further, high arousal makes the capacity to separate relevant from irrelevant features less effective, which increases a predisposition to the allocation policy (Kahneman, 1973). So, it is possible that the high arousal and low performance of the Antisocial offenders under the Reward condition could be due to an eventual interference of monetary reward that concentrates their attention on that

particular aspect. This may push the task of recognising facially expressed emotions into the background, however, when the antisocial offenders already have the monetary reward in their possession, this may actually help them focus on the task. This possible explanation is supported by the data showing that the antisocial offenders have a higher magnitude of SCR under the Response Cost condition than the controls, but perform (under that experimental condition in the emotion identification task) just as well as the Controls under the three experimental conditions.

If we interpret these results on the basis of an impulsivity pattern due to difficulties in the inhibition process (Fowles, 1987), that characterises the forensic population in general (He, Cassaday, Howard, Khalifa, & Bonardi, 2011), Antisocial offenders under the No Contingency condition do not have enough motivation to inhibit this automatic response, but having the monetary reward in their possession seems to be sufficient motivation to inhibit the impulsive response, while the prospect of obtaining the monetary reward interferes with the inhibitory process concerning the impulsive response. However, this thesis was not supported by the present results because there are no significant differences in the response reaction time.

These findings may also be considered in light of the revised Reinforcement Sensitivity Theory - RST (Gray, 1981, 1987; Gray & McNaughton, 2000), it seems that the antisocial participants studied display a normal Fight/Flight/Freeze System/ Behavioural Inhibition System (FFFS/BIS) and a hyperactive Behavioural Activation System (BAS). Antisocial offenders under the No Contingency condition are not activated or motivated so they performed worse than the controls, at least, under the Response Cost condition. However, the two monetary conditions produced similar activation with different behavioural consequences: in a conflicting situation such as the Response Cost condition, antisocial offenders seem to be FFFS/BIS reactive, whereby

they succeed in increasing their attention on the facial affect stimulus, performing as well as the controls. While under the Reward condition, and because the antisocial offenders are hyper oriented towards the reward, the prospect of obtaining a monetary reward negatively interferes in the task because their attention is focused on the reward and not the facial expression. These results support the thesis that the BAS, in predisposed individuals, could elicit antisocial tendencies (Gray, 1970, 1972, 1982, 1990) and the results of the previous study by Taylor, Reeves, James, and Bobadilla (2006) that found that Antisocial Personality Disorder is associated with a strong BAS, however our Antisocial participants, different to the ones in this previous study, seem to have a normal BIS.

Our results seem to indicate that there is not a true correspondence between the psychophysiological response and the quality of the cognitive/behavioural response, giving support to the thesis that variations of autonomic arousal may not totally explain emotional processing (Heims et al., 2004) and emphasizing the importance of monetary contingency as a differential motivator for antisocial individuals and controls.

This study has some limitations, such as the impossibility of controlling whether participants had, or not, consumed alcohol or drugs beyond their own statement; the choice of the area under the curve for the measure of psychophysiological response because, in a 10-second time window, several different fluctuations may occur, where phasic responses may be combined with nonspecific or spontaneous fluctuations (Gläscher & Adolphs, 2003). Another limitation is the reduced number of pictures for each emotion under each experimental condition, which prevented us from doing an analysis for each particular emotion. Also, the No Contingency condition will need to be placed first in the series of conditions to prevent any eventual contamination of the effect of the monetary contingency conditions in future studies. In future researches it

must be assessed whether higher monetary values (under the Monetary contingency condition) would modulate the performance and physiological response of the controls in the same way as the antisocial offenders' performance. In addition, the value of the participants' monthly or annual earnings needs to be included in the variables studied, in order to be able to control this variable more precisely. The sample needs to be increased in order to see if the marginal and not significant differences of the performance of the antisocial group under the No contingencies condition becomes or not significant when compared with the control group under the No contingency and Reward conditions.

As general conclusions our data suggest that antisocial offenders are more sensitive to monetary contingencies than controls. Also, the condition monetary Response Cost seems to raise the performance of the antisocial offenders up to the level of the controls, while the monetary Reward seems to decrease the performance of the antisocial group. The results from this study are important to clarify the mechanism by which monetary conditions may impair the way antisocial individuals identify emotions in facial expressions, thus providing a possible explanation for some types of behaviour where the recognition of facial expressions and an expectation of monetary reward are involved in the offence. In addition, these results draw attention to the importance of the use of monetary response cost in the prevention of recidivism programs for antisocial offenders. Also, these results warn researchers of the relevance of different reward/response cost schemes when making methodological decisions concerning studies with these individuals.

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CAPÍTULO 8

SOCIAL CONTINGENCIES MODULATE THE ABILITY TO IDENTIFY FACIAL AFFECT: COMPARATIVE RESEARCH [10]

[10] *Para ser submetido ao Perceptual & Motor Skills Journal*

Resumo

Este estudo compara o desempenho de 42 antissociais criminosos com 42 controlos numa tarefa de identificação de emoções faciais manipulando as contingências da tarefa (Sem Contingência, Feedback, Punição Social, Recompensa Social e Desafio Social com Recompensa).

Os resultados evidenciam um efeito principal de grupo, com os antissociais criminosos a revelar pior desempenho do que os controlos na tarefa de identificação de emoções em expressões faciais, mas não se encontraram diferenças entre os grupos em nenhuma das condições de contingência manipuladas. Encontrou-se um efeito principal nas condições de Recompensa social e Desafio social com recompensa, com o desempenho dos participantes a melhorar em ambas.

Em conclusão, as contingências sociais parecem influenciar da mesma maneira a capacidade de identificar emoções através de expressões faciais em ofensores antissociais e criminosos.

Palavras-chave: criminosos antissociais, identificação de emoções facialmente expressas, contingências sociais, recompensa social, punição social, feedback.

Abstract

This study compares the performance of 42 antisocial offenders and 42 controls on a facial emotion identification task, applying a randomized crossover design with five experimental conditions (No Contingency, Feedback, Social Reward, Social Punishment and Rewarded Social Challenge).

One main group effect was found, where the antisocial offenders exhibited a worse performance than the controls on the task of identifying of facially expressed emotions. However, no differences between groups for any other of the experimental conditions studied were found. The main effect observed for the conditions of Social Reward and Rewarded Social Challenge was that all the participants improved under both.

In conclusion it seems that social contingencies may influence the ability to identify facially expressed emotions of antisocial offenders and controls in the same manner.

Keywords: antisocial offenders, identification of facial affect, social contingencies, social reward, social punishment, feedback.

Introduction

The processing of facial expressions of emotion plays a critical role in social interaction. Frequently facial expressions are the only source of information available, regarding the emotional state of another individual (Maister, Tsiakkas, & Tsakiris, 2013). Indeed, the identification of facial expressions is fundamental to the perception of the mental states of others (Kitada et al., 2013) and must be correctly performed to have a communicative function (Thunberg, 2007).

There are several disorders associated with low ability to recognize facial expressions of emotion, such as Schizophrenia (Mandal, Pandey, & Prasad, 1998; Trémeau, 2006), Autism (Golarai, Grill-Spector, & Reiss, 2006), Depression and Bipolar Disorder (Kohler, Hoffman, Eastman, Healey, & Moberg, 2011), ADHD (Pelc, Kornreich**,** Foisy**,** & Dan**,** 2006), Substance Abuse and Dependence Disorders (Kornreich et al., 2010; Serrano, Lozano, Garcia, & Garcia, 2010), and Antisocial Personality Disorder (Marsh & Blair, 2008), with important consequences to an individual's social integration. It is theorized that deficits in the identification of facial expressions of emotion can lead to antisocial behaviour (Howner et al., 2011), since the identification of another's emotional state has been considered the first stage of empathy and it is well known that a lack of empathy may be assumed as a tendency towards aggressive behaviour (Marshall & Marshall, 2011). However, studies focused on the processing of facial expressions of emotion among those with Antisocial Personality Disorder are controversial, as some suggest a general deficit, especially in violent offenders (Hoaken, Allaby, & Earle, 2007), while others have not indicated any such deficit (Book, Quinsey, & Langford, 2007; Glass & Newman, 2006; Kosson, Suchy, Mayer, & Libby, 2002; Pfabigan, Alexopoulos, & Sailer, 2012). Further, other studies

have suggested that these dysfunctions are limited to specific emotions such as fear, sadness, and surprise (Marsh & Blair, 2008).But, contradictory findings also exist for specific emotional categories. For example, Schönenberg, Louis, Mayer, and Jusyte (2013) suggest that antisocial subjects need more intense stimuli to recognize angry faces, whereas Iria, Barbosa, and Paixão (2012) suggest that this population is overresponsive to this emotion.

One possible reason for these contradictory findings may be due to differences in the methodological design of the studies that may interfere with the tasks, namely the type of contingencies used, since they have an impact on cognitive control. In fact, the behavior is motivated by the "pull" of external goals (Hockenbury & Hockenbury, 2003) and behavior from one situation to another can be modified by the incentives or by the value attributed to persons to those incentives (Bernstein, 2011).

Thus, we performed a comparative study between antisocial offenders and controls in order to know whether social contingencies interfere with the identification of facial expressions of emotion. Two groups performed a task of identification of facial affect under five conditions: (1) No Contingency, (2) Feedback, (3) Social Punishment, (4) Social Reward, and (5) Rewarded Social Challenge. Considering that antisocial behaviour involves a failure in the socialization process (Lykken, 1995), we predicted that social contingencies would not interfere in the performance of the antisocial offenders. We further predicted that social contingencies would influence the performance of the control group, with Social Reward and Rewarded Social Challenge increasing the performance and Social Punishment decreasing it.

Materials and Methods

Participants and selection procedure

Antisocial offenders were recruited by advertising the experiment in institutions that work with ex-prisoners. Controls were recruited by advertising in social, cultural and sports associations. The inclusion criteria for both groups were to be a male, aged between 20 and 65 years old and to have been drug, alcohol or medication free for at least six months. Specific inclusion criteria to antisocial offenders were having two or more effective convictions to prison and meeting the diagnosis criteria for Antisocial Personality Disorder, according to DSM-V (American Psychiatric Association, 2012). One of the criteria to be included in the control group was never to have broken the law. Exclusion criteria for both groups were: significant sensory or motor impairments; an Intellectual Ability score (IA) < 12, as assessed using a shortened version of Raven's Matrices, a history of neurological or psychiatric problems; and the present use of drugs, alcohol, or medication.

Participant screening was initially carried out by using a semi-structured interview conducted by a senior clinical psychologist, in which: motor and sensory capabilities, alcohol use/dependence, other drug use, medical history and mental health history, intellectual and clinical assessment, and criminal records were assessed. The criminal records of all the participants in the antisocial offender group were checked.

Eighty-four individuals, forty-two in each group, were accepted to participate in the study and none quit during the experiment. The participants were not financially rewarded on this task and provided written informed consent and a legal authorization to check their criminal record. The two groups were matched by gender (all male), age, education and intellectual ability (Table 1), but not by past dependency or serious

alcohol or drug abuse. For this reason this variable was included in the analysis as explained below.

Table 1
Demographic characteristics

	OG (*n*=42)	CG (*n*=42)	*t-value/* $\chi 2$	*p* value
Age	39.41 (9.19)	37.55 (11.79)	.81	.12
Intellectual Ability	16.07 (3.69)	16.45. (4.47)	-.43	.23
Education (years)	7.57 (2.94)	8.36. 3.14)	-1.17	.65
Criminal typology	26 Pp; 36 Pt; 13St; 37Dg			
Number of convictions	2.67 (.98)			
Months of imprisonment	81.98 (43.00)			
Past alcohol or drugs addiction	31	8	13.56	<.001

OG, offender group; CG, control group; n, number of participants; Pp, crimes against people (murder, grievous bodily harm, domestic violence, kidnapping, illegal restraint, rape, trafficking of human beings); Pt, crimes against patrimony (theft, organized or armed robbery, swindling, racketeering and extortion, handling stolen goods); St, crimes against society (forgery of administrative documents, counterfeiting of currency, forgery of means of payment, arson); Dg, illicit trafficking in narcotic drugs and psychotropic substances. All data show mean values (± *SD*) or number of cases.

Materials

NimStim Data Set

Sixty pictures from the Portuguese validation of the NimStim Data Set (Tottenham et al., 2009) were used. The selected pictures were comprised of colour photographs showing male and female actors expressing the six basic emotions (Ekman,

1972): happiness, disgust, fear, anger, sadness and surprise (ten photographs per emotional category) on a white background. The selected pictures had obtained 50% to 60% correct identification in the Portuguese normative study (Iria, Paixão, & Barbosa, 2008), as a means of controlling the degree of difficulty of the task between emotional categories.

IA Test

A shortened version of Raven's Matrices, standardized to the Portuguese population with a sample of 3228 participants (2937 males) (Amaral, 1966), was applied to assess cognitive ability. It comprises five series (A, B, C, D, and E) of six items each (30 in total). In each item, the participant is asked to identify the missing segment (between six to eight alternative segments) that is required to complete a larger pattern. Each correct response corresponds to one point.

Procedure

The experimental task was completed in a single session. Each participant was individually tested in a quiet and private room. The pictures were administered using a notebook (14.1'' screen) placed 1m in front of the participants, running Superlab V4.0 (2008, Cedrus corp., San Pedro, USA). Each picture was presented once for 10 sec with an equal inter stimuli interval (ISI), during which a fixation point was displayed. The participants had a peripheral keypad with a key for each of the six basic emotions and were instructed to click on the key where the corresponding emotion was written, as fast as they could. The photographs were initially presented in a random sequence, without

any kind of feedback. The five experimental conditions (No Contingency, Feedback, Social Reward, Social Punishment) were randomly presented and the condition Rewarded Social Challenge was always presented at the end. 12 pictures of facial expressions of emotions - 2 pictures for each emotion, were exhibited for each experimental condition. The pictures under each condition were also randomized.

All subjects received detailed instructions about the experimental conditions at the beginning of each task. The instructions were:

- For the No Contingency condition: “Your task is to identify the emotion that each person in each photo is feeling and then click on the corresponding button as quickly as possible.”

- For the Feedback condition: “Your task is to identify the emotion that each person in each photo is feeling and then click on the corresponding button as quickly as possible. After answering, you will hear a voice identifying your answer as correct or incorrect.”

- For the Social Reward condition: “Your task is to identify the emotion that each person in each photo is feeling and then click on the corresponding button as quickly as possible. After answering correctly you will hear a voice identifying your answer as correct, which means that you are very skilled at recognizing emotions.”

- For the Social Punishment condition: “Your task is to identify the emotion that each person in each photo is feeling and click on the corresponding button as quickly as possible. After answering incorrectly you will hear a voice saying that the answer is incorrect, meaning you are not skilled in the recognition of emotions.”

- For the Social Challenge Rewarded condition: "Your task is to identify the emotion that each person in each photo is feeling and then click on the corresponding button as quickly as possible. Your score is about to be the best of all the participants. If you correctly identify the emotions that people are feeling in the next series you will be the best."

Data Analysis

Repeated ANOVA were performed with *experimental condition* (No Contingency, Feedback, Social Punishment, Social Reward, Rewarded Social Challenge) serving as a within-subjects factor, and *group* (Antisocial Group, Control) as between-subjects factor. Also, the variable "dependency or serious drug or alcohol abuse in the past" was included as a between-subjects factor since there was an unequal number of participants in the two groups reporting such dependency, and previous studies had related this variable to emotional identification deficits (Serrano et al., 2010). The dependent measures were the Number of errors (Errors), corresponding to the number of misidentified emotions, with values varying between 0 (no errors in the two stimuli by emotion), 1 (one error in one stimuli of the two), and 2 (two errors in both stimuli) and the General Reaction Time (GRT), in milliseconds, corresponding to the reaction time for all responses. These two measures were independently analyzed and a post-hoc Newman-Keuls test was applied for the analyses of specific effects. Normality and homogeneity assumptions were verified in all cases.

All analyses were performed using the software Statistica, version 8.0 (2008, StatSoft Inc., Tulsa, USA).

Results

Mean and standard errors for the two measures (Number of Errors and General Reaction Time) were computed for the two groups and the five experimental conditions. In the following paragraphs, the main and interaction effects of the group and experimental conditions for the above-mentioned measures are presented.

Number of Errors

Considering the number of errors, our results show a main effect for *Group*, $F(1,80) = 5.16$, $p = .026$, with the Antisocial Group ($M = 2.78$, $SE = .21$) having a poorer performance than the Controls ($M = 2.07$, $SE = .24$). There is also a main effect for *Experimental conditions*, $F(4,320) = 4.79$, $p < .001$. Post-hoc analyses (Newman-Keuls test) show that the participants perform better under the Social reward condition ($M = 1.89$, $SE = .24$) than under the No Contingency condition ($M = 2.77$, $SE = .25$, $p < .01$), the Feedback condition ($M = 2.85$, $SE = .23$, $p < .01$) and the Social Punishment condition ($M = 2.61$, $SE = .27$, $p < .01$). Also, the participants perform better under the Social Reward condition ($M = 2.00$, $SE = .21$) than under the No Contingency ($M = 2.77$, $SE = .25$) and the Feedback conditions ($M = 2.85$, $SE = .23$). Results may be seen in Figure 1.

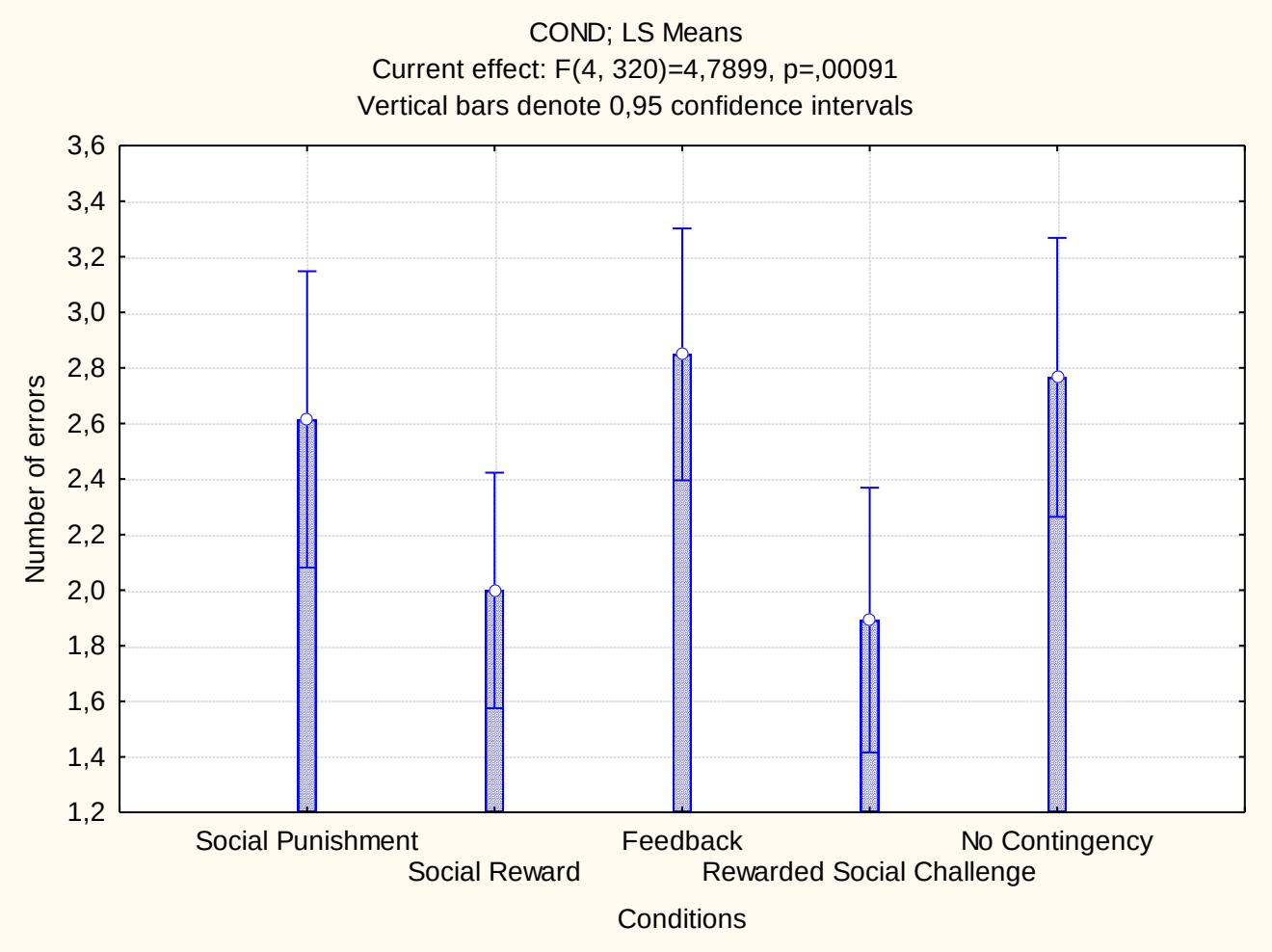

Figure 1. Number of errors committed by participants in Social Punishment, Social Reward, Feedback, Rewarded Social Challenge and No Contingency

However, ANOVA did not yield an effect for the interaction *Group*Experimental condition*, $F(4, 320) = 3.37$, $p > .05$. Results may be seen in Table 2.

General Reaction Time

There were no main effects for *Group* ($F < 1$) *Experimental conditions* ($F < 1$), or for the interaction *Group*Experimental conditions* ($F < 1$). Results may be seen in Table 2.

Table 2
Mean (M) and standard errors (SE) for Number of Errors and General Reaction Time in milliseconds (msec) for the antisocial offender group (AOG) and control group (CG) under the conditions: No Contingency, Feedback, Social Punishment, Social Reward and Rewarded Social Challenge

	Number of errors		General Reaction Time	
Conditions	AOG (*n*=42) *M (SE)*	CG (*n*=42) *M (SE)*	AOG (*n*=42) *M (SE)*	CG (*n*=42) *M (SE)*
No Contingency	3.11 (.34)	2.42 (.38)	3964.92 (159.26)	3562 (179)
Feedback	3.26 (.30)	2.43 (.34)	4008.47 (165.21)	4016 (185)
Social Punishment	2.93 (.06)	2.30 (.40)	3714.47 (162.83)	3839 (182)
Social Reward	2.46 (.28)	1.54 (.32)	3838.32 (170.03)	3978 (190)
Social Challenge Rewarded	2.14 (.32)	1.64 (.36)	3862.04 (165.96)	3690 (186)

Dependency or serious abuse of alcohol or drugs

As the group of offenders and non-criminals were not equivalent in relation to the variable *Dependency or serious alcohol or drug abuse* (meaning, the self-reported history of drug/alcohol abuse for a minimum period of six consecutive months) we decided to explore the effects of this variable. No main effects of such factor were detected for the Number of Errors, $F < 1$; $p = .08$), neither for the interactions of *Group*Dependency or serious abuse of alcohol or drugs* and *Experimental conditions*Dependency or serious abuse of alcohol or drugs* (both $F < 1$).

Conversely, in relation to General Reaction Time (in milliseconds) a main effect for the factor *Dependency or serious abuse of alcohol or drugs in the past*, $F(1,80) = 4.61$, $p = .04$, was found. Participants reporting previous dependency had a longer reaction time ($M = 4055$ msec, $SE = 143$) than the other participants ($M = 3648$ msec, $SE = 125$).

Discussion

In this study we tested whether social contingencies are significant motivators in the performance of antisocial offenders and controls when identifying emotions in facial expressions. Contrary to our hypothesis, the performance of antisocial offenders and controls was modulated in a similar way by the contingencies studied. Likewise the performance of the two groups did not differ within each experimental condition (No Contingency, Feedback, Social Punishment, Social Reward, and Social Challenge Rewarded).

Both groups performed better under the conditions of Social Challenge Rewarded and Social Reward than under the other conditions (No Contingency, Feedback and Social Punishment), and the results under the two rewarding conditions did not differ. This suggests that Social Reward and Rewarded Social Challenge are equally important behavioural motivators, both to offenders and controls, improving performance in identifying facial expressions of emotion. On the contrary, Social Punishment does not improve performance, neither in the antisocial offenders nor the controls. The absence of differences between the groups may mean that the antisocial offenders and the controls do not differ in sensitivity to the different contingencies. This result is particularly interesting since previous investigations (Iria, Paixão, & Barbosa, *submitted*) have showed that antisocial offenders seem sensitive to the expectation of punishment, namely of a response cost type, which increases their accuracy when identifying facial emotions.. However, punishment in the aforementioned study had a material nature, and not a social one. Also, simple feedback does not seem to have a significant influence on the accuracy of the participants in the identification of facial

expressions of emotion. This data gives support to previous research that has found that feedback has highly variable effects in performance, either improving it, worsening it, or not influencing it at all (Kluger & DeNisi, 1996). These results also indicate that the past abuse of alcohol or drugs increases the reaction time in the identification facial emotions,, even if it does not have a significant effect on task accuracy, similar to the study by Fein, Key, and Szymanski (2010). No interaction effects were found between the consumption of alcohol or drugs and the experimental conditions.

Since we have a main effect for group, our results give support to previous research (Marsh & Blair, 2008) suggesting that antisocial offenders seem to suffer impairment in the ability to identify emotions from facial expressions and methodological variations regarding contingencies do not account for such impairments. However this may be due to the reduced number of pictures for each condition. So, in future research it may be important to use more stimuli for each condition. It may also be useful to perform similar experimental tasks with a simultaneous record of psychophysiological responses, in order to know if social contingencies modulate this particular measure of emotional processing.

In conclusion, this study shows that when identifying facial emotions, antisocial offenders and controls are motivated in the same direction by the various contingencies, although antisocial offenders seem to have a general deficit in the ability to identify facial expressions of emotion when compared with controls. The results of this study are important as they may help to screen out possible methodological reasons why contradictory data were obtained in previous research on the identification of facial affect by antisocial offenders and might shed light on the possible effects of different contingencies. The latter point may prove important to future research in this field.

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DISCUSSÃO GERAL E CONCLUSÕES FINAIS

Discussão geral

Neste capítulo, sintetizamos e discutimos, de forma integrada, os principais resultados, identificando algumas limitações dos estudos, as principais conclusões da tese, as implicações e as perspetivas de investigações futuras.

Os resultados dos estudos apresentados nos estudos 1, 2, 3 e 4, respeitantes à análise do material-estímulo do NimStim Data Set e ao uso de medidas psicofisiológicas para estudar o processamento de emoções facialmente expressas permitiram-nos otimizar as condições experimentais utilizadas ao longo da nossa investigação. Os resultados obtidos nos estudos 5, 6, 7 e 8, respeitantes à influência da variável psicopatia e das contingências materiais e sociais na identificação de emoções em expressões faciais, permitiram-nos obter um melhor conhecimento das especificidades dos participantes envolvidos no estudo no que respeita às circunstâncias individuais no processamento de identificação de emoções em expressões faciais que poderão, eventualmente, relacionar-se com o cometimento de crimes.

A discussão e integração dos resultados é feita de acordo com a sequência da apresentação dos estudos nesta tese, como se descreve a seguir.

No primeiro estudo, procedeu-se à adaptação do NimStim Data Set (Tottenham et al., 2009) à população portuguesa (Iria, Paixão, & Barbosa, 2008). Foram encontradas variações na percentagem de acerto semelhantes aos estudos efetuados por Ekman et al. (1987) (compreendidas entre 16 e 29 pontos percentuais). Esta variação reforça a tese da universalidade do reconhecimento das emoções básicas através de expressões faciais, mas também a necessidade de adaptação cultural deste tipo de estímulos. Por este motivo, a organização original destas imagens foi revista, eliminando-se as imagens que evidenciaram não medir, convenientemente, a emoção

pretendida. Deste estudo de adaptação do NimStim à população portuguesa resultou o NimStim-Pt, instrumento válido para o estudo do processamento emocional com recurso a expressões faciais.

A identificação de emoções em expressões faciais é influenciada por fatores sociodemográficos, mas importava investigar, como fizemos no nosso segundo estudo, a influência simultânea de vários desses fatores, designadamente idade, sexo e nível de educação (Iria, Paixão, & Barbosa, *in revision*). No caso das emoções de valência negativa (Tristeza, Raiva, Medo e Nojo), o aumento da idade tende a diminuir a capacidade de as identificar. O aumento da escolaridade tem o efeito inverso, incrementando a capacidade de reconhecimento das emoções negativas, bem como da surpresa. O sexo apenas influencia a capacidade de reconhecimento da emoção de tristeza, com o sexo feminino a identificar melhor esta emoção.

No terceiro estudo, analisou-se a resposta eletrodérmica e a temperatura cutânea da pele de criminosos psicopatas e não psicopatas quando expostos a expressões faciais. Verificou-se que os criminosos psicopatas avaliados, quando comparados com criminosos não-psicopatas, mostraram-se menos responsivos para a emoção de medo, na medida amplitude média da resposta eletrodérmica. Também se verificou que, apesar do tempo de exposição a cada estímulo ser longo (10 segundos), a análise dos traçados por inspeção visual mostrou que a ausência de intervalo interestímulos (ISI) não permitia a todos os sujeitos completar o tempo de recuperação antes do estímulo seguinte. O controlo desta variável foi realizado nos estudos subsequentes, com a introdução de um ISI entre as imagens. Da reflexão geral sobre os resultados obtidos surgiu ainda a hipótese de que estes refletem a própria operacionalização da Psicopatia. De facto, um dos fatores da PCL:SV refere-se exatamente à componente emocional da psicopatia, ou seja, implicitamente avalia as reações emocionais e outros aspetos que

podem ser índices importantes do processamento emocional (Saarni, Campos, Camras, & Witherington, 2008). Deste estudo resultaram, assim, mudanças no procedimento utilizado nas investigações subsequentes, designadamente: a introdução de um ISI entre as imagens; e a utilização apenas da medida da resposta eletrodérmica em detrimento da temperatura cutânea, que se revelou menos sensível para detetar diferenças nesta população.

No quarto estudo, respeitante à investigação da resposta eletrodérmica em criminosos e controlos, verificou-se que os criminosos persistentes apresentam uma maior ativação eletrodérmica na tarefa de identificação de emoções expressas facialmente do que os controlos. Desta vez utilizou-se como medida psicofisiológica os valores médios da resposta eletrodérmica (corrigidos com a linha basal). Estes resultados contradizem alguns estudos que mostram que os antissociais, em geral, tendem a exibir uma menor ativação psicofisiológica nas tarefas de identificação de emoções (Buikhuisen, Bontekoe, Plas-Korenhoff, & Buuren, 1984; Raine, Bihrle, Vernables, Mednick, & Pollock, 1999; Raine & Venables, 1984; Raine, Venables, & Williams, 1990; Wahlund, Sorman, Gavazzeni, Fischer, & Kristiansson, 2010). Perante os resultados obtidos foram colocadas as seguintes hipóteses explicativas: os grupos não terem sido devidamente classificados pelo nível de psicopatia; a tarefa de identificar emoções ser particularmente difícil para a população criminal; os resultados poderem dever-se a um efeito iatrogénico do equipamento poligráfico, particularmente para a população criminosa, dado este equipamento ser conhecido como "detetor de mentiras" e/ou pelo aspeto tecnológico com que se apresenta.

Da análise gráfica dos traçados dos estudos 3 e 4 surgiu a hipótese de que as medidas utilizadas nestes estudos – temperatura cutânea, amplitude média e o nível médio da resposta eletrodérmica ao estímulo com correção pelo nível tónico ou linha

basal - poderiam não ser as mais adequadas para investigar esta temática, nesta população. Esta conclusão deriva do facto de alguns participantes não completarem a curva de recuperação da resposta eletrodérmica até ao nível inicial havendo, por isso, um aumento do nível médio da condutância elétrica da pele na imagem seguinte. Outros indivíduos apresentaram um nível de ativação inferior ao do nível de base e, outros ainda, uma resposta eletrodérmica quase impercetível. A isto acresce a decisão de se utilizar, por ser mais rápida, fiável e precisa, uma análise automatizada dos dados (em detrimento da inspeção visual). Por essa razão nos estudos posteriores da condutância elétrica da pele utilizou-se como medida a área sob curva, uma vez que integra a amplitude e as características temporais da Resposta de Condutância da Pele (Boucsein, 1992; Naqvi & Bechara, 2006), sendo ainda mais adequada para análises automatizadas (Figner & Murphy, *in press*). Por outro lado, o feedback recolhido, no final da experiência, junto dos participantes sugeriu que, para além da instrução de visualizar as imagens de diferentes expressões faciais a aparecer no ecrã, se deveria acrescentar a tarefa de identificação das emoções faciais apresentadas. Esta alteração foi também introduzida nos estudos posteriores, a fim de evitar que os recursos atencionais dos participantes se descentrassem da tarefa.

Conhecidas as condições experimentais que melhor se adequavam ao nosso estudo era necessário estudar as especificidades dos nossos participantes ao nível do processamento da informação emocional e agrupá-los de acordo com o nível de psicopatia, trabalho que desenvolvemos ao longo do quinto estudo. Verificou-se que os psicopatas (criminosos e não criminosos) apresentaram um pior desempenho (omissões) na identificação do medo e da tristeza do que os não-psicopatas (criminosos e não criminosos), sugerindo que os psicopatas apresentam especificidades na forma como processam esta informação emocional. Estes resultados sugerem que é a psicopatia, e

não o comportamento criminal *per se*, a variável que determina os défices de identificação emocional encontrados para o medo e para a tristeza. Assim, os nossos resultados reforçam a hipótese de que a psicopatia se caracteriza por uma disfunção específica do processamento emocional (Blair, Mitchell, & Blair, 2005), e que o comportamento antissocial poderá não ser uma característica da psicopatia (Gao & Raine, 2010). Foram, ainda, resultados do estudo uma hiperresponsividade negativa, ou seja, identificações erradas para as emoções de raiva e medo, uma caraterística comum aos dois grupos de criminosos (psicopatas e não-psicopatas). Estes erros por falsos-alarmes, para além de serem uma medida da fraca inibição comportamental, revelam também informação sobre a perceção emocional (Schulz et al., 2007).

Já depois de realizado este estudo foram revistos os critérios da Perturbação de Personalidade Antissocial, constantes na atual DSM-V (American Psychiatric Association, 2012), tendo-se optado por utilizar esta designação clínica de Perturbação de Personalidade Antissocial, nos estudos realizados posteriormente, em detrimento da designação psiquiátrico-forense de psicopatia (Morana, Stone, & Abdalla-Filho, 2006), aproveitando a sobreposição quase total de diagnósticos de Perturbação de Personalidade Antissocial e Psicopatia na DSM-V (Strickland et al., 2013). Esta nossa opção foi suportada pelos resultados da entrevista clínica, destinada a triar problemas psiquiátricos e neurológicos que pudessem influenciar a investigação. Também se verificou que os criminosos persistentes, para além da característica comum do cometimento reiterado de crimes, preenchiam os critérios de diagnóstico da Perturbação de Personalidade Antissocial definidos pelo DSM-IV-R e pela DSM-V.

Nos estudos sexto e sétimo investigou-se a influência de contingências de expetativa de recompensa material, expetativa de custo de resposta material, ou de

inexistência de contingências materiais na identificação de emoções em expressões faciais em criminosos antissociais persistentes e controlos não criminais.

No estudo sexto verificou-se uma interação entre o grupo e as condições experimentais testadas com os criminosos antissociais persistentes a cometerem mais erros quando tinham a expetativa de obter uma recompensa material. Ao contrário, os criminosos antissociais persistentes, quando não havia qualquer expetativa de obtenção de contingência material, cometeram menos erros, e ainda menos quando tinham a expetativa de um custo de resposta. Os criminosos antissociais persistentes na condição de recompensa material também cometeram mais erros do que o grupo controlo em todas as condições experimentais. Os resultados sugerem que os dados contraditórios existentes na literatura relativos ao desempenho de antissociais em tarefas de identificação de expressões faciais, designadamente os estudos onde foram encontrados défices nas performances (Dolan & Fullam, 2006; Iria & Barbosa, 2009; Iria, Barbosa, & Paixão, 2012; Marsh & Blair, 2008; Robinson et al., 2012) e aqueles onde tais défices não foram encontrados (Book, Quinsey, & Langford, 2007; Glass & Newman, 2006; Kosson, Suchy, Mayer, & Libby, 2002; Minzenberg, Poole, & Vinogradov, 2006) poderão relacionar-se com variáveis específicas da tarefa. Mais concretamente, a expetativa de obter uma recompensa monetária parece interferir negativamente na capacidade de reconhecer emoções através de expressões faciais nos criminosos antissociais persistentes, enquanto a expetativa de um custo de resposta melhora a sua performance. Assim, os criminosos antissociais persistentes estudados poderão ter um padrão específico de resposta, em tarefas de identificação de emoções expressas facialmente, orientado para a recompensa material e para o evitamento do custo de resposta material. Desta forma, os resultados do nosso estudo vão ao encontro dos resultados obtidos por Oberlin et al. (2012) que mostraram existir uma maior ativação

cerebral nas áreas de reforço nos antissociais, bem como de Lu et al. (2013) que evidenciaram que a instrução da recompensa pode implicitamente distrair a atenção, se a recompensa se tornar ela própria o objetivo primeiro, piorando, dessa forma, o desempenho. A ser assim, poderia acontecer que, se os antissociais tiverem, desde o início, a recompensa na sua posse, esta já não prejudicaria a tarefa, ajudando-os até a focarem-se na mesma, o que parece ser o caso da condição de custo de resposta. Em contraste, não foram encontradas diferenças no tempo de reação aos estímulos intra ou entre grupos nas diferentes condições experimentais, o que parece indiciar que a expetativa de receber uma recompensa material ou de ter um custo de resposta não leva a uma maior impulsividade nas respostas dadas. Este estudo evidenciou, assim, a possível importância da hipersensibilidade à recompensa material como traço de personalidade, eventualmente útil para distinguir os criminosos reincidentes dos controlos, indo ao encontro da proposta de Leue, Brocke e Hoyer (2008). Por outro lado, os resultados também indiciam que as condições experimentais, designadamente as contingências materiais, moderam de forma distinta o desempenho de criminosos antissociais persistentes, comparativamente com controlos na tarefa de identificação de expressões faciais.

Uma vez que os resultados desta investigação se baseavam apenas em respostas comportamentais, tornou-se necessário estudar as respostas psicofisiológicas na tarefa de identificação de emoções através de expressões faciais nas três condições experimentais antes referidas. Para tal optou-se por utilizar, no estudo seguinte, a medida da área sob a curva da resposta eletrodérmica, por ser uma medida da ativação do sistema nervoso autónomo prática e fácil de usar. Tal investigação foi realizada no estudo sétimo, no qual foi comparado o desempenho na tarefa de identificação de emoções facialmente expressas, entre um grupo de criminosos persistentes antissociais e

um grupo controlo em três condições experimentais aplicadas aleatoriamente (recompensa material, custo de resposta material e sem contingências), utilizando as medidas: número de erros cometidos, tempo de reação e área sob a curva da resposta eletrodérmica numa tarefa de identificação de emoções expressas facialmente. Verificou-se que os criminosos antissociais persistentes na condição de custo de resposta apresentaram uma maior área sob a curva da resposta eletrodérmica mas cometeram um número de erros equivalente e apresentaram tempos semelhantes de reação comparativamente com os controlos. Essa observação parece indiciar que ter a recompensa material na sua posse auxilia os criminosos antissociais persistentes a focarem a atenção na tarefa de identificação. De maneira inversa, a maior área sob a curva da resposta eletrodérmica dos criminosos comparativamente com os controlos na condição de recompensa material associa-se a um significativo aumento no cometimento de erros, o que poderá dever-se a uma eventual interferência da recompensa material na tarefa. Ou seja, estes resultados sugerem que, quando existe a expetativa de receber uma recompensa material, a atenção dos criminosos persistentes antissociais parecer ficar focada na obtenção desta recompensa em deterimento da execução da tarefa de identificação da emoção facialmente expressa. Quando comparamos os números de erros cometidos pelos criminosos persistentes, nas três condições testadas, verificamos que na condição sem contingência o desempenho é fraco, semelhante ao obtido na condição de recompensa monetária. No entanto, se compararmos a área da curva da condutância eletrodérmica da pele verifica-se que as condições materiais (recompensa e custo de resposta) provocam uma maior ativação do que a condição de sem contingência.

Estes resultados parecem sugerir que a condição sem contingência não ativa os criminosos antissociais persistentes para a execução da tarefa. Por sua vez, os controlos

não apresentam diferenças na área sob a curva da resposta eletrodérmica nas três condições experimentais. Se for feita uma leitura dos resultados através da Teoria da Sensibilidade ao Reforço - RST (Gray, 1981, 1987, Gray & McNaughton, 2000), parece que os criminosos antissociais persistentes têm um sistema Luta/Fuga/Paralisa (FFFS) ou um Sistema de Inibição Comportamental (BIS) normal, pelo que numa situação de conflito, como na condição de custo de resposta, conseguem aumentar a atenção, resultando num desempenho tão bom quanto os controlos. Por outro lado, parecem ter um Sistema de Ativação Comportamental (BAS) hiperativo que, na condição de recompensa monetária, orienta a sua atenção para a expetativa de obtenção da recompensa em vez de a focalizar nos estímulos. Estes resultados suportam, ainda, a hipótese de que o BAS forte poderá predispor para tendências antissociais (Gray, 1970; 1972; 1982; 1990) e apoiam os dados obtidos por Taylor, Reeves, James e Bobadilla (2006) que sugerem uma associação entre a Perturbação de Personalidade Antissocial e um BAS forte. Uma outra hipótese explicativa seria a de interpretar estes resultados pelo padrão de impulsividade relacionado às dificuldades no processo de inibição (Fowles, 1987), que caracteriza a população forense em geral (He, Cassaday, Howard, Khalifa, & Bonardi, 2011). No entanto, tal parece não ser possível, por não haver diferenças significativas no tempo de resposta entre os grupos. Assim, os resultados sugerem, por um lado, que as contingências materiais têm um valor de incentivo com efeito diferencial em criminosos e controlos, e por outro, indiciam não existir uma verdadeira correspondência entre a medida psicofisiológica estudada e a qualidade da resposta cognitivo/comportamental, reforçando a tese de que o processamento de informação socialmente relevante, como a emocional, não é criticamente dependente da ativação autonómica (Heims et al., 2004).

No estudo oitavo comparou-se o desempenho na tarefa de identificação de emoções facialmente expressas de um grupo de criminosos antissociais persistentes com um grupo controlo em quatro condições sociais aplicadas aleatoriamente: sem contingência, feedback, recompensa social e punição social, e ainda na condição de desafio social com recompensa, aplicada no final de todas, utilizando como medidas o número de erros cometidos e o tempo de reação numa tarefa de identificação de emoções expressas facialmente. Os resultados sugerem que as contingências sociais influenciaram, de maneira semelhante, os dois grupos. Assim, as condições de recompensa social e de desafio social com recompensa melhoraram o desempenho de ambos os grupos, que não se distinguiram entre si. Também os desempenhos obtidos nas condições de sem contingência, feedback e punição foram semelhantes, o que sugere que a punição social não é um incentivo para melhorar o desempenho para os dois grupos. Em contraste, se se considerar o desempenho de todas as condições como um todo, revela-se um efeito de grupo, sendo que os criminosos antissociais persistentes apresentam um pior desempenho do que os controlos. Estes resultados, apesar de não distinguirem as emoções entre si, apoiam o estudo de Marsh e Blair (2008) sugerindo uma disfunção na capacidade de identificar algumas emoções em populações antissociais. O facto de esta disfunção não se revelar numa diferença de desempenho nas condições de sem contingência e de feedback será, provavelmente, resultado do reduzido número de estímulos utilizados em cada condição experimental. Estes resultados indiciam que o grupo de criminosos antissociais persistentes e os controlos não diferem na sensibilidade às contingências sociais estudadas.

Em conclusão, os resultados contraditórios existentes na literatura, referentes às possíveis disfunções na identificação de emoções em expressões faciais em criminosos, poderão dever-se ao nível de psicopatia e às contingências materiais e sociais

relacionadas com a tarefa. Este resultado contribui para um melhor conhecimento do processamento de informação emocional em indivíduos que cometem crimes de forma persistente.

Limitações

Uma das principais limitações dos estudos realizados centra-se na restrição temporal da participação de cada sujeito. Isto é, no facto desta participação não poder ser muito longa (por provocar cansaço), nem faseada (por implicar faltas sistemáticas por parte dos criminosos persistentes). Estas implicações acabaram por obrigar a uma gestão do esforço e do tempo exigido a estes sujeitos, o que levou a algumas opções, como a de não realizar, após a avaliação de triagem dos participantes, uma entrevista clínica aprofundada (onde se poderia obter informação mais rica e detalhada sobre possíveis diagnósticos clínicos e deteção de comorbilidades).

Outras limitações relacionam-se com a própria amostra. Uma vez que todos os nossos participantes, criminosos antissociais persistentes e controlos, foram recrutados na comunidade, não nos é possível saber se os criminosos antissociais persistentes que se encontram em estado de reclusão apresentariam desempenhos diferentes. Para além disso, os nossos estudos foram realizados com criminosos antissociais persistentes com nível sociocultural baixo e médio baixo, o que reflete a realidade da maioria dos criminosos reincidentes portugueses. Todavia, dada a referida distribuição sociocultural, os resultados obtidos não poderão ser generalizados para criminosos antissociais persistentes pertencentes a outros níveis socioculturais.

Acresce que apenas foi possível avaliar a existência de antigas ou atuais situações de abuso de substâncias psicotrópicas através do relato dos participantes, por

ser difícil, neste âmbito, fazer análises sanguíneas ou urinárias, ou aceder aos registos clínicos dos participantes.

Outra limitação prende-se com o próprio desenho experimental implementado nos estudos. Por um lado, fruto da adaptação do NimStim, apenas ficaram disponíveis para aplicar à população portuguesa um reduzido número de estímulos de medo - inicialmente 14 (Iria, Barbosa, & Paixão, 2008) que depois foram reduzidos a 13 (Iria, Paixão, & Barbosa, *in revision*), motivo pelo qual apenas se utilizaram duas imagens por emoção em cada condição experimental (de modo a conseguir um número idêntico de estímulos por emoção). Tal procedimento impossibilitou-nos de tirar conclusões mais precisas no estudo sobre correlatos psicofisiológicos no processamento de expressões faciais, o que se conseguiria, por exemplo, analisando os resultados por emoção. Por outro lado, torna-se necessário, em futuras investigações, controlar de forma mais minuciosa a influência da variável de contingência material, apurando o seu valor de incentivo para cada participante que depende, por exemplo, do nível de rendimento individual. Só assim será possível definir o valor da recompensa material em função dessa realidade e, desse modo, testar se os participantes controlos terão, ou não, resultados idênticos aos criminosos persistentes. Também, a opção metodológica de aleatorizar as condições experimentais poderá (ou não) ter levado a que o desempenho na condição de "Sem Contingência" tenha sido pior por falta de incentivo (positivo ou negativo) de que os participantes dispunham nas outras condições. Assim, teria sido melhor que essa condição tivesse sido sempre administrada em primeiro lugar, quando os esquemas de incentivo ainda não tinham influenciado o comportamento dos participantes.

Conclusões finais

1. As variáveis sociodemográficas sexo, idade e nível de educação parecem ser fatores importantes que influenciam a capacidade de identificar as emoções expressas facialmente. O aumento do nível de educação prediz uma maior capacidade de identificar todas as emoções básicas, com exceção da alegria, enquanto o aumento da idade prediz um declínio na capacidade de identificar emoções negativas. O sexo feminino prediz um maior reconhecimento da emoção de tristeza.

2. Um elevado grau de psicopatia parece estar relacionado com uma hiporresponsividade psicofisiológica em relação à emoção de medo, enquanto a antissociabilidade em geral parece ser caraterizada por uma hiperresponsividade psicofisiológica às expressões faciais em geral.

3. Os criminosos e os psicopatas (criminosos e não criminosos) parecem partilhar uma disfunção comum, nomeadamente falsas-identificações de algumas emoções negativas, designadamente de medo e de raiva.

4. O comportamento criminal parece não se relacionar diretamente com o défice na identificação de emoções básicas (medo e tristeza) através de expressões faciais nos indivíduos com elevado nível de psicopatia.

5. A expetativa de receber uma recompensa material parece influenciar negativamente o desempenho dos criminosos antissociais persistentes na tarefa de identificar emoções através de expressões faciais, enquanto a expetativa de perder dinheiro aumenta esta mesma capacidade para o nível equivalente à dos controlos. Assim, parece ser possível afirmar que os criminosos antissociais persistentes parecem apresentar uma hipersensibilidade negativa às

recompensas materiais e uma sensibilidade ao incentivo do custo de resposta material.

6. No nível psicofisiológico (área sob a curva da resposta eletrodérmica) os criminosos antissociais persistentes parecem ser mais ativados pelas contingências materiais do que os controlos. Assim, as contingências materiais parecem assumir o valor de incentivo diferenciador dos criminosos antissociais persistentes dos não criminosos.

7. A inexistência de correspondência entre a medida psicofisiológica da resposta da condutância da pele (área sob a curva) e a qualidade da resposta cognitiva/comportamental, sugere que haverá, para além dos fatores biológicos, fatores de outra natureza associados ao disfuncionamento emocional de criminosos antissociais persistentes.

8. As contingências sociais parecem não ser um fator de incentivo diferenciador no desempenho (número de erros cometido) na tarefa de identificação de emoções facialmente expressas entre criminosos antissociais persistentes e controlos. Estas condições sociais influenciam os desempenhos dos dois grupos de forma equivalente, sendo que a Recompensa Social e o Desafio Social com Recompensa parecem melhorar o desempenho.

9. Em determinadas condições (Custo de Resposta Material e Sem Contingências) os criminosos antissociais são tão eficientes a identificar emoções facialmente expressas quanto os controlos, o que poderá ser uma explicação para a hipótese de alguns criminosos antissociais persistentes parecerem ser hábeis na manipulação das emoções dos outros, apesar de

poderem apresentar défices na capacidade de identificação de algumas emoções nesses outros em algumas condições.

Investigações futuras

Deste estudo surgiram muitas questões para as quais são necessárias novas investigações. Não pretendendo ser exaustivos, surgem como mais importantes as seguintes:

1. Investigar a atenção dos criminosos persistentes em esquemas experimentais que permitam perceber: a) se a recompensa material orienta ou não a atenção para si própria desviando a atenção da tarefa, incluindo a Resposta Cardíaca como medida psicofisiológica da atenção (por via do Reflexo de Orientação); b) se os possíveis défices atencionais em alguns criminosos antissociais persistentes poderão ser (ou não) um efeito da influência das contingências experimentais (por exemplo, contingências materiais e sociais). Note-se a importância e as consequências, em termos de resultados, de um participante ser pago numa experiência bem como da conduta (e.g. recompensadora) do investigador.

2. Investigar os défices na inibição de resposta dos criminosos persistentes, nomeadamente saber se estes são, ou não, moderados pelas expetativas de contingências materiais e sociais.

3. Outras questões surgem, nomeadamente as relativas aos incentivos para os criminosos antissociais persistentes: existirão outros tipos de recompensas (por exemplo farmacológicas, virtuais, …), capazes de os incentivar? Na situação de expetativa de recompensa material os participantes estavam incentivados para fazer o quê? Para

finalizar o mais rapidamente possível a tarefa? Para ter acesso à recompensa? Ou para ter um bom desempenho, de modo a obter a recompensa?

4. É ainda uma implicação do nosso estudo, embora não diretamente relacionada com a área forense, a necessidade de investigar qual a percentagem de variação explicada, por exemplo, pelas variáveis biológicas (e.g. concentração hormonal), psicológicas (e.g. habilidades cognitivas) ou sociais (e.g. etnicidade) que precisam eventualmente de ser consideradas na investigação da capacidade de identificação de expressões faciais ou, simplesmente, na avaliação desta capacidade para fins clínicos.

Implicações

As implicações do nosso trabalho podem evidenciar-se nos seguintes pontos:

Obtenção de um instrumento de medida da identificação de expressões faciais, NimStim-Pt, com indicadores psicométricos e dados normativos para a população portuguesa, suscetíveis de serem utilizados em estudos comparativos com diversas populações (incluindo as populações clínicas) bem como em estudos transculturais.

Conhecimento da influência das variáveis sexo, idade e escolaridade no desempenho em tarefas de identificação de emoções através de expressões faciais em populações não clínicas.

Conhecimento do processamento emocional de criminosos psicopatas e criminosos não psicopatas, tendo-se inclusivamente apurado especificidades do processamento de emoções através de expressões faciais dos dois grupos.

Identificação de algumas variáveis (contingências materiais e sociais) que poderão explicar a disparidade dos resultados publicados relativos ao processamento emocional nos criminosos antissociais persistentes.

Evidenciação da importância do controlo destas variáveis nos estudos com os criminosos antissociais persistentes e respetivos controlos.

Melhoria dos procedimentos, designadamente no estudo da resposta eletrodérmica, que poderão vir a ser aplicados noutros estudos.

Desenvolvimento da hipótese da hipersensibilidade negativa à recompensa material dos criminosos antissociais persistentes ser um traço de personalidade desta população, que podem levar, precisamente, entre outras possibilidades, à falha adaptativa evidenciada no cometimento de crimes de forma reiterada.

Desenvolvimento da hipótese da sensibilidade ao incentivo do custo de resposta material ser um traço de personalidade dos criminosos antissociais persistentes.

Evidenciação da importância que a escolaridade, particularmente a escolaridade dos criminosos antissociais persistentes, pode ter no desempenho de tarefas importantes para as relações sociais.

Para além destas implicações, os resultados sugerem que nos programas com os criminosos antissociais persistentes se pode eleger, como alvo de intervenção, a hipersensibilidade negativa à recompensa material, bem como a sensibilidade ao custo de resposta material e à recompensa social, de modo a promover comportamentos adaptativos com esta população.

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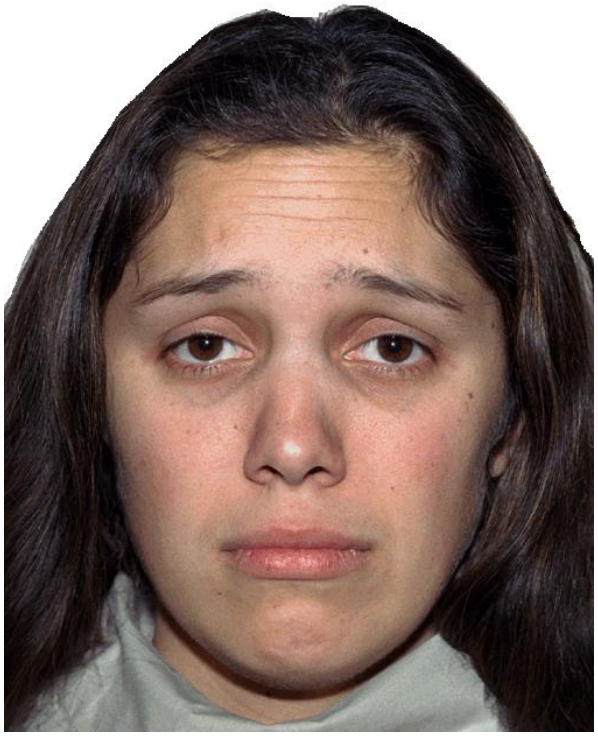
APÊNDICE

A.1 - **Exemplo de estímulo do NimStim Data Set**



03F_SA_C

O desenvolvimento do *MacBrain Face Stimulus Set* foi supervisionado por Nim Tottenham sob patrocínio da *John D. and Catherine T. MacArthur Foundation Research Network on Early Experience and Brain Development*. Contactar Nim Tottenham em tott0006@tc.umn.edu para mais informação sobre os estímulos.