



FACULDADE DE MEDICINA DA UNIVERSIDADE DE COIMBRA
MESTRADO INTEGRADO EM MEDICINA – TRABALHO FINAL

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***AUTISTIC TRAITS AND CRIMINAL BEHAVIOUR:
A CROSS-SECTIONAL STUDY IN COIMBRA PENITENTIARY***

ARTIGO CIENTÍFICO

ÁREA CIENTÍFICA DE PSIQUIATRIA

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MARÇO/2017

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ABSTRACT

Introduction: Autism Spectrum Disorders (ASD) have been associated with violent and criminal behaviours, but the relationship remains unclear, with a great deal of speculation and controversy involving the subject. This study aims to determine: 1) if criminal offenders have a different burden of autistic traits in relation to non-offenders; 2) if certain types of crime and related features are associated with a higher number and certain autistic traits; 3) assess ASD prevalence in a Portuguese penitentiary.

Methods: A questionnaire with demographic, criminal data and the Autism Spectrum Quotient (AQ) was applied, randomly, to volunteer prisoners, with, at least, 4 years of education, age between 18 and 65 years and enough knowledge of Portuguese to self-administer the AQ. A control group of non-offenders, with similar age and without a psychiatric background, was also assessed.

Results: The penitentiary group, with 2.97% scoring higher than 32, had a greater mean total AQ score than the control group (20.61 ± 5.49 vs 18.11 ± 4.84 ; $t(209) = 3.522$, $p = 0.001$). None of the controls scored higher than 32. No significant differences were found between the total and subscales AQ scores related to the various types of crime and other crime-related components.

Discussion: The current study suggests that there is a higher burden of autistic traits in the incarcerated population than in non-offenders. This suggests that some sort of combination of core features seen in ASD may represent a risk factor for offending behaviour, not only in individuals with ASD but also in their peers. This study did not establish any particular crime linked to higher number of autistic traits, neither found any difference between other crime related features. The study found a prevalence of ASD based on the AQ of 2.97%. This result should be confirmed by the evaluation of those prisoners by a psychiatrist, but it is in accordance to other studies, implying that

ASD is not remarkably overrepresented in prisons. Future implications of these results are also addressed.

KEYWORDS

Autism Spectrum Disorder; Autism-Spectrum Quotient; Criminal Behaviour; Violence; Prison; Criminal Justice; DSM-5;

ABBREVIATIONS

AQ – Autism-Spectrum Quotient;

ARC - Autism Research Centre, at the University of Cambridge;

ASD – Autism Spectrum Disorder;

DSM - Diagnostic and Statistical Manual of Mental Disorders;

JS – Justice System;

P₂₅ – Percentile 25;

P₇₅ – Percentile 75;

RESUMO

Introdução: As Perturbações do Espectro do Autismo (PEA) têm sido associadas a comportamentos violentos e criminosos, mas a relação continua pouco clara, com especulação e controvérsia a envolver a questão. Este estudo tem como objetivos determinar: 1) se indivíduos presos diferem quanto ao número de traços autistas em relação a não-criminosos; 2) se existe alguma diferença entre o número de traços autistas em relação aos diversos tipos de crimes cometidos e outros antecedentes criminais, e se há alguma tendência quanto à categoria dos traços; 3) a prevalência de PEA na Penitenciária de Coimbra.

Métodos: Foi aplicado um questionário contendo questões demográficas, do percurso criminal e o Quociente de Espectro Autista (AQ). Os participantes foram escolhidos aleatoriamente, sendo incluídos no estudo aqueles com, pelo menos, 4 anos de escolaridade, idade entre os 18 e os 65 anos, e conhecimento da língua portuguesa suficiente para permitir o preenchimento do AQ. Foi obtido um grupo de controlo com indivíduos que nunca cometeram crimes e sem antecedentes psiquiátricos, com uma idade semelhante à amostra prisional.

Resultados: O grupo da prisão, com 2.97% da amostra com pontuação superior a 32, teve em média um score no AQ total superior ao do grupo de controlo (20.61 ± 5.49 contra 18.11 ± 4.84 ; $t(209) = 3.522$, $p = 0.001$). Nenhum dos indivíduos do grupo de controlo teve pontuações superiores a 32. Não houve diferenças estatisticamente significativas entre as pontuações obtidas no AQ total e sub-escalas, aquando da comparação entre os vários tipos de crime e outros antecedentes criminais.

Discussão: Este estudo sugere a existência de uma maior carga de traços autistas na população prisional comparativamente à população não-criminal. Este aspecto realça o facto de que combinações de características nucleares das PEA poderão constituir

factores de risco para comportamentos criminosos, não só em indivíduos com uma PEA, mas também naqueles sem a doença. Este estudo não estabeleceu nenhum crime, nem qualquer antecedente criminal, particularmente relacionado a um maior número de traços autistas. Encontrou-se uma prevalência de PEA, baseado no AQ, de 2.97%. Este valor deverá ser ratificado após confirmação diagnóstica destes prisioneiros, recorrendo a um psiquiatra. Este resultado encontra-se de acordo com os valores do extremo inferior obtidos noutros estudos, sugerindo que a PEA é, de facto, prevalente num contexto prisional, mas não tão marcadamente como alguns referem. Algumas implicações futuras destes resultados são abordadas no final.

INTRODUCTION

Autism Spectrum Disorder (ASD) is a set of heterogeneous neurodevelopmental disorders, defined in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as a dyad of features: (1) persistent deficits in social communication and social interaction across contexts; (2) restricted, repetitive patterns of behaviour, interests, or activities. These symptoms must be present in early childhood, even if they only fully manifest later, and have to limit and impair everyday functioning for a diagnosis to be made. Language and intellectual impairment can also be present, and there is a high incidence of co-occurring medical, developmental and psychiatric conditions.¹ The worldwide prevalence is estimated to be 1-2% and has been increasing, with 4.5 fold predominance in the male gender.² In Portugal, the global prevalence of ASD is currently unknown, since it was last estimated in 2000, according to the DSM-IV criteria, with the results of 9.2 per 10.000 in the mainland, and 15.6 per 10.000 in Azores.^{2,3}

Since the first studies about Autism, aggressive behaviours have been described in this population^{1,4-7} and the association between them and violent crimes has been reported in the literature and in the press, rising the interest in this subject.⁵⁻⁹ Indeed, some features of ASD could potentially increase the likelihood of aggressive or criminal behaviours, such as impairment in communication and understanding of social interactions, difficulties in moral judgement and poor theory of mind, poor emotional regulation, anxiety and sensory overload, obsessional interests, and presence of psychiatric co-morbidities, along with others.^{1,6,9,10} These features are thought to be the result of changes in regional brain anatomy, the so-called social brain, that are hypoactive in the functional MRI across tasks in which social perception and cognition are used, and atypical neural connectivity.^{1,11}

In the last years, a significant number of studies tried to determine whether ASD is, in fact, associated with violence and crime, but research has been inconsistent and inconclusive.^{5,6,9} Generally, prevalence studies of ASD within the Justice System (JS) suggest that they are somewhat overrepresented in the offender population,^{5,9} as well as in the Juvenile JS, with some authors referring young age as a risk factor.^{5,10,12} However, the substantial variation of prevalence rates (2 to 27%) preclude any definitive conclusions.^{6,9,10,13} On the other hand, accumulating evidence suggest that, while individuals with ASD seem to have similar or even lower levels of violent crime than healthy controls, they are particularly prone to commit offenses against other people and arson, with some studies also referring a tendency to sexual offenses.^{5,6,9,10}

For the purpose of this study, violent crimes are defined as intentional threats, attempts, or infliction of bodily and mind harm on another person, which includes the following, as defined in the Portuguese Criminal Code: 1) crimes against other people which englobes 1.1) homicide, 1.2) crimes against physical integrity, 1.3) crimes against personal liberty, as kidnaping, and 1.4) crimes against sexual liberty and auto-determination, as rape; and 2) crimes against property, in which only robbery is taken into account. Non-violent crimes are those which do not meet these criteria, comprising all crimes against property, except robbery, against cultural identity and personal integrity, and against society and the state, all provided in the criminal code, and also drug trafficking which is embodied in the Portuguese drug law.

Presently, the relationship between ASD and criminal behaviours is still unclear, with a great deal of speculation and controversy involving the subject, especially in the media that has an enormous impact in public perception of the disease.^{5,9} The current study tries to aid this clarification by focusing on the features of the disease, aiming to determine if the offending population has a higher burden of autistic traits than non-

offenders. Additionally, it explores the relationship between the number of autistic traits and various types of crime, concentrating in the differences between violent and non-violent groups, and other crime-related aspects. Lastly, it intends to assess the prevalence of ASD in the Penitentiary of Coimbra.

MATERIALS AND METHODS

PARTICIPANTS

Participants were recruited from the Central Penitentiary of Coimbra, a high security correctional facility, located in the central region of Portugal, with a population of 424 male inmates. Most of the convicts have been sentenced to more than 10 years of imprisonment, about 25% of the population has 20 to 30 years of age and there is a high rate of recurrence.¹⁴

The study was conducted between October, 2015, and January, 2016, with weekly visits to recruit participants. Prisoners were invited to the study if they had between the age of 18 and 65, at least 4 years of education, and enough knowledge of Portuguese language to allow the self-administration of the questionnaires. The inmates were selected randomly by the guards, and written informed consent was obtained from all the participants. The Ethics committee of the Penitentiary of Coimbra approved all the procedures used in this study, including the method of obtaining consent, in accordance with the Declaration of Helsinki.

The control group was obtained, from January until October, 2016, by administering the same questionnaire to voluntary male individuals, using the same age, education and language criteria applied in the penitentiary sample, after assuring that they were never prosecuted for a crime and had no psychiatric history or diagnosis.

For the purpose of the study, early contact with the justice system is considered below the age of 16, since they are not imputable under the Portuguese law.

QUESTIONNAIRE

The questionnaire was divided into three parts, the first two were filled out with the help of the investigators, and the last one was self-administered:

Demographic questionnaire: current age, academic qualifications and civil status.

Criminal record: previous sentences other than imprisonment, and previous incarcerations, age of first contact with the JS and the crimes they were prosecuted for in the present imprisonment.

The Autism-Spectrum Quotient (AQ): The AQ, developed by Baron-Cohen and colleagues in 2001, is a brief, self-administered scale for identifying the degree to which any adult individual, of normal IQ, in the general population, may have “autistic traits”, thus rapidly quantifying where it is situated on the continuum from autism to normality.¹⁵ It comprises 50 questions in total, and assesses 5 different areas, each of them with 10 items: social skill (AQ Social), communication (AQ Communication), imagination (AQ Imagination), attention to detail (AQ Attention to Detail) and attention switching (AQ Attention Switching).¹⁵ Each of the questions scores 1 point if the respondent records the “autistic-like behaviour” mildly or strongly.¹⁵ (Appendix I) This abnormality englobes poor social skill, communication, imagination and attention-switching and, additionally, exceptional attention to detail.¹⁵ The AQ has reasonable face validity, excellent test-retest reliability, and does not appear to be influenced by the IQ or by the socioeconomic status.¹⁵ In the first study with the AQ, carried out in the UK, it was established a score of 32 as a useful cut-off for screening individuals who have clinically significant levels of autistic traits and should be observed by a

psychiatrist. Even though there may be some slight discrepancy between scores in the populations studied, due to, probably, some cultural differences, it has been proved that the AQ can be used in research studies across different cultures.¹⁶ Presently, the AQ has been validated in numerous countries¹⁷⁻¹⁹, although not yet in the Portuguese population, but the English version has been translated for ARC and it was used in this study.²⁰ (Appendix II)

STATISTICAL ANALYSIS:

The statistical analysis was conducted by SPSS 20 with the significance level set at $p < 0.05$.

The normality of total and subcategory AQ scores distributions between the subgroups was determined with Kolmogorov-Smirnov test, if the size of the sample n was more than 25, and Shapiro Wilk, if the n was between 10 and 25.

Student t-test and Mann-Whitney U test were used to compare total and subcategory AQ scores between the prison and the control groups and in dichotomous subgroups, according to the character of the crime (*i.e.* homicide and violent crime) and other characteristics (*i.e.* early contact with the judicial system, previous convictions other than incarceration, and previous imprisonments) as parametric and non-parametric alternatives correspondingly. Kruskal-Wallis test was used to compare the scores between the six main types of crime prosecuted (*i.e.* homicide, crime against physical integrity, crime against patrimony, drug trafficking, robbery, other).

RESULTS

DEMOGRAPHIC CHARACTERISTICS

The final penitentiary sample consisted of 101 male prisoners (23.82%), with mean age of 37.9 ± 8.4 years, ranging from 23 to 64 years. Most participants (66.3%) had 6 to 9 years of education and were single (61.4%).

The control group consisted of 110 men, non-offenders, with a median age of 40 ± 9 years, ranging from 18 to 64 years. Most individuals (61.8%) had 9 to 12 years of education and were married (76.4%).

CRIME RECORD CHARACTERISTICS

A total of 49.5% of the prisoners had previous convictions, other than imprisonment, 13.9% had 1 and 11.9% 2, and the rest had between 3 and 15 previous convictions.

Almost half of the population (48.5%) had been incarcerated before, 25.7% once and 12.9% twice in their life. The rest had between 3 and 7 previous imprisonments.

The current imprisonment was mainly due to crime against property (41.6%), homicide (26.7%), crime against physical integrity (15.8%), drug trafficking (7.9%) and robbery (4%), resulting in 46.5% of violent and 53.5% non-violent crimes. (Figure 1)

The median age of the first contact with the JS was 19 [16-24.5] years, ranging from 9 to 50 years, with 16.8% of the individuals having an early contact with the JS.

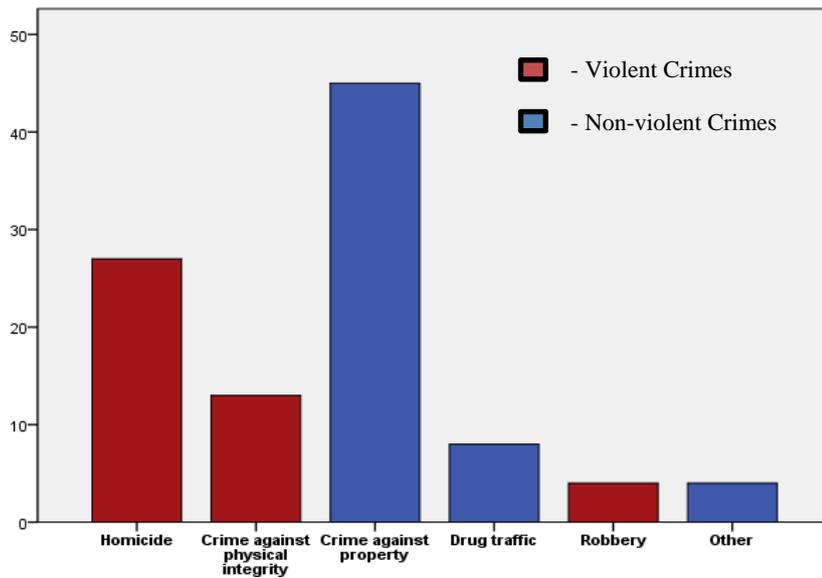


Figure 1 Frequency of the main types of crime. “Other” consists of three cases of crime against life in society and one case of tax fraud.

AQ TEST

The mean total AQ score in the penitentiary group was 20.61 ± 5.49 , ranging from 7 to 37, with 2.97% ($n = 3$) scoring higher than 32 and 1% ($n = 1$) scoring 31. The rest of the population had values below 30. In the control group, the mean total AQ score was 18.11 ± 4.84 , ranging from 6 to 30, with no individuals scoring higher than 32, or 31. In average, prisoners had a significantly higher total AQ score in comparison to non-offenders ($t(209) = 3.522, p = 0.001$).

	Prisoners	Control	<i>U</i>	<i>p</i>
	Median [P ₂₅ – P ₇₅]			
Social	3 [2 – 4]	3 [2 - 4]	5440	0.792
Communication	3 [2 – 4]	2 [1 - 4]	3987	<0.001
Imagination	4 [3 – 5]	4 [3 - 5]	4997.5	0.202
Attention to Details	5 [4 – 7]	4 [3 - 6]	4519.5	0.018
Attention Switching	5 [3 – 6]	4 [4 - 5]	5315	0.581

Table 1 Subcategory AQ scores statistics and comparisons between prisoners and controls.

Total	37	33	33	31
Social	8	9	6	7
Communication	9	7	5	4
Imagination	9	6	5	6
Attention to Detail	5	8	9	8
Attention Switching	6	3	8	6
Crime condemned for	Crime against property*	Crime against property*	Homicide	Homicide
Violent Crime	No	No	Yes	Yes
Early contact with the JS	Yes. 13 years	No	No	No
Previous convictions other than imprisonment	0	0	0	0
Previous incarcerations	1	0	0	0
Current Age (years)	43	29	35	25
Civil Status	Single	Single	Single	Single
Academic Qualifications	9 th grade	9 th grade	Higher education	6 th grade

Table 2 Total and subcategory AQ, demographic, and crime related features of individuals with Total AQ score higher than 32 and borderline. *= crime against property excluding robbery.

COMPARISON OF THE MEAN TOTAL AND SUBSCALE AQ SCORES BETWEEN GROUPS

Homicide vs Other Crime

Prisoners who committed homicide had a mean total AQ score similar to the one of the participants convicted for other crimes (20.89 ± 1.08 vs. 20.51 ± 0.64 ; $t(99) = -0.303$, $p = 0.763$), and similar subcategory scores. (Table 3)

	Homicide	Other Crime	<i>U</i>	<i>p</i>
	Median [P ₂₅ – P ₇₅]			
Social	3 [2 - 4]	2.5 [2 - 4]	984.5	0.910
Communication	3 [2 - 5]	3 [2 - 4]	984.5	0.677
Imagination	4 [4 - 5]	4 [3 - 6]	929.5	0.588
Attention to Detail	6 [4 - 7]	5 [3.75–6.25]	831.5	0.195
Attention Switching	5 [3 - 6]	5 [3 - 6]	970	0.821

Table 3 Comparisons of subcategory AQ scores between prisoners who committed homicide and those who did not.

Violent crime vs non-violent crime

The mean total AQ score in prisoners who committed a violent crime was similar to those who did not (20.54 ± 0.81 vs 20.70 ± 0.73 ; $t(99) = -0.165$, $p = 0.881$), as well as the subscale scores. (Table 4)

	Violent crime	Other Crime	<i>U</i>	<i>p</i>
	Median [P ₂₅ – P ₇₅]			
Social	3 [2 - 4]	2 [2 - 4]	1143.5	0.384
Communication	3 [2 - 4]	3 [2 - 5]	1250.5	0.898
Imagination	4 [3 - 5]	4 [3 - 6]	1179	0.533
Attention to Detail	5 [4 - 7]	5 [3.75 - 7]	1213.5	0.703
Attention Switching	5 [3 - 6]	5 [3 - 6]	1152.5	0.421

Table 4 Comparisons of subcategory AQ scores between prisoners who committed a violent crime and those who did not

Different types of crimes

No statistically significant differences were observed between the total AQ score ($X^2(5)=2.876$ $p=0.719$), AQ Social ($X^2(5)=3.573$ $p=0.612$), AQ Communication ($X^2(5)=1.470$ $p=0.917$), AQ Imagination ($X^2(5)=2.769$ $p=0.735$), AQ Attention to Details ($X^2(5)=5.549$ $p=0.353$) and AQ Attention switching ($X^2(5)=0.859$ $p=0.973$) in the subjects of the six groups of crimes (*i.e.* Homicide, Crime against physical integrity, Crime against patrimony, Drug traffic, Robbery and Other.)

Early contact with the JS

Prisoners who had an early contact with the JS had total AQ scores similar to those who did not have (20.53 ± 6.385 vs 20.63 ± 5.332 ; $t(99) = -0.069$, $p = 0.945$), and similar subscale scores. (Table 5)

	Early Contact with the JS Median [P ₂₅ – P ₇₅]	Without	<i>U</i>	<i>p</i>
Social	2 [2 - 4]	3 [2 - 4]	695,5	0,864
Communication	4 [2 – 5.5]	3 [2 - 4]	607	0.324
Imagination	4 [2 – 5.5]	4 [3 – 5]	593.5	0.266
Attention to Detail	5 [3 – 6.5]	5 [4 – 7]	655.5	0.592
Attention Switching	4 [2.5 – 6]	5 [3.25–6]	617.5	0.374

Table 5 Comparisons of subcategory AQ scores between prisoners who had an early contact with the JS and those who did not have.

Previous convictions other than imprisonment

Comparison of total and subcategory AQ scores between prisoners who had previous convictions, other than imprisonment, and those who had not, yielded no statistically significant differences. (Table 6)

	With previous convictions other than imprisonment Median [P ₂₅ – P ₇₅]	Without	<i>U</i>	<i>p</i>
Total	20.50 [17.75 – 24]	19 [17–25]	1242	0,822
Social	2.50 [2 – 4]	3 [1 – 5]	1257,5	0,904
Communication	3 [2 – 4]	4 [2 – 5]	1206,5	0,637
Imagination	4 [3 – 5.25]	4 [3 – 5]	1269	0,967
Attention to Detail	5 [4 – 6.25]	5 [3 – 7]	1173	0,484
Attention Switching	5 [3 – 6]	4 [4 – 6]	1258,5	0,909

Table 6 Comparisons of mean total and subcategory AQ scores between prisoners who had previous convictions, other than imprisonment, and those without them.

Previous Imprisonments

Prisoners who have been incarcerated before had similar mean total AQ scores to those who have not (20.49 ± 0.82 vs 20.73 ± 0.74 ; $t(99) = -0.219$, $p = 0.827$), and similar subscale scores. (Table 7)

	With previous imprisonments	Without	<i>U</i>	<i>p</i>
	Median [P ₂₅ – P ₇₅]			
Social	2 [2 – 4]	3 [2 – 4]	1203	0,623
Communication	4 [2 – 5]	3 [2 – 4]	1068,5	0,157
Imagination	4 [3 – 5]	5 [3 – 5.75]	1070	0,159
Attention to Detail	5 [4 – 7]	5 [4 – 7]	1248,5	0,861
Attention Switching	4 [3 – 6]	5 [3.25 – 6]	1184	0,535

Table 7 Comparisons of subcategory AQ scores between prisoners who have been imprisoned before and those who have not.

DISCUSSION

The current study found that criminal offenders had a higher burden of autistic traits in comparison to age-matched controls with AQ total score of 20.61 vs. 18.11, respectively. This difference was a result of poorer communication skills along with stronger attention to details by the offending population.

There are, to the best of the authors' knowledge, two more studies applying the AQ to different Portuguese groups in non-forensic settings. Both reported a mean total AQ score similar to the control group used in the current study.^{21,22} Identical values were also obtained in two other European studies, which included all-male control groups from the UK and Poland.^{15,19} However, the UK group reported lower scores in the subcategories communication, imagination and, to lesser extent, attention switching in comparison to the incarcerated population of the current study, whereas the polish sample had lower scores in attention to details instead of communication. These differences were not replicated when comparing the criminal sample to the control group, which may be explained by cultural and educational heterogeneity between studies. Still, the total AQ scores, that are consistent across all studies with non-offender individuals, have lower values than the one obtained in this prison sample. This strongly suggests that the offending population presents a higher number of autistic traits in comparison to the general population. Accordingly, even though many prisoners do not

have an ASD, they share some of the core features of the disease, supporting the hypothesis that some characteristics of ASD may potentially increase the likelihood of criminal behaviours.^{1,6,9,10}

While some studies demonstrates that ASD offending population is particularly prone to certain types of crimes,^{5,6,9,10} no differences were found regarding the autistic burden between violent and non-violent crimes, homicide and non-homicide, and the most prevalent crimes in the penitentiary.

An over-representation of ASD in Juvenile JS is reported in some literature and epidemiological statistics,^{10,12,23} with young age emerging as a risk factor for violence in ASD. The current study did not find any evidence of more autistic traits in individuals who had an early contact with the JS, which may suggest that individuals with higher burden of autistic traits may not be in direct risk of offending early in life.

There are some reports of repeated criminal behaviour in ASD offenders.^{24,25} In the current study, individuals with one or more previous incarcerations or other convictions had no more autistic traits than those who had not. This may indicate that there is no obvious greater risk of criminal recurrence in individuals with higher autistic burden comparing to their counterparts or it is possible that the ones with greater risk of recurrence are hold in other institutions.

The estimated prevalence of ASD in the penitentiary sample based on the AQ was 2.97%. None of the control individuals met the screening criteria of the AQ. This value is lower than the rate of 4.4% found in an US incarcerated population, resorting also to the AQ, with identical mean total AQ score and similar age, but differing in the types of crimes committed.²⁶ On the other hand, a more recent study conducted in an UK penitentiary found a prevalence somewhat higher than 2%, a value in accordance with this study.¹³ Provided that the estimated prevalence of ASD in a diversity of

forensic settings varies greatly (2 to 27%), the one found in Coimbra Penitentiary is in conformity with the values of the lower end.^{5,6,9,13,27} Considering that the worldwide prevalence of ASD in the general population is estimated to be around 1% (with male predominance), the current findings suggest that ASD may be overrepresented, although not remarkably, in the offender population. However, it should be noted that proper conclusions are difficult to extract as the current prevalence of ASD in Portugal is not known (the last study pointed as less than 1%).³ In the control sample,

LIMITATIONS

This study has several limitations. Firstly, the control group has a higher education and a different civil status than the prison sample, which may limit the comparison results. Secondly, comparisons within groups based on criminal features (e.g. type of crime and early contact with the JS) were limited by the reduced number of participants in each subgroup. Arson and sexual crimes were not represented in the final sample.

Definitive conclusions about the prevalence of ASD cannot be drawn since the AQ is a screening tool and individuals who scored more than 32 were not subsequently assessed by a psychiatrist in order to obtain a clinical diagnosis. Most prevalence studies differ in methodology and most also had difficulties confirming the values found with a psychiatric diagnosis, so direct comparisons are hard to make.^{5,6,9,28} Only one study, to the authors' knowledge, was also solely based on the AQ, but it did not explore the subcategories scores.²⁶ The AQ has not been yet validated in the Portuguese population, which additionally limits inferences about the prevalence, however, it has been proved that the AQ can be used in research studies across different cultures.¹⁶ It is

important, as well, to determine the present prevalence of ASD in Portugal and to compare it with the one established in the current study.

FUTURE IMPLICATIONS

The finding of a higher burden of autistic traits in individuals in prisons than in the general population has important implications. It remains to be determined which ASD features, or which combinations, represent risk factors to the practice of criminal behaviours, and at what extent, not only in persons who suffer from the disease, but also in non-ASD individuals. Future autonomic, electrocortical and functional neuroimaging studies could potentially clarify whether violent and criminal behaviours share a common neurobiological background with ASD features. Some research on this area has already been conducted revealing some brain regions and neuroconnections that are commonly affected in ASD and in non-ASD individuals with history of violence, but the relation is still unclear.^{29,30} The identification of this regions or neurologic alterations may aid in the development of more target-specific therapies that could be helpful in both ASD and in non-ASD offending individuals.

The current study, along with others, suggests an overrepresentation of ASD in forensic settings, even though there is not a direct relation between this finding and an increased likelihood for criminal behaviours. The ideal study to explore this topic would be a prospective, community-based comparison study of a large group with ASD and a control group. However, this kind of investigation is incredibly difficult to conduct and implies years of monitoring. One hypothesis that should be explored to explain this apparently contradiction is that ASD may have greater rates of incarceration than their counterparts, in the exact same legal contexts, since it would explain the overrepresentation in the JS, even though they are not more likely to criminal

behaviour. Other future measures should include the identification of factors that can increase the likelihood of an ASD individual to commit a crime, and which are possible to revert or to some extent control. Several studies have suggested some risk and predisposing elements, that are also common to the general population, as male gender , younger age, comorbid psychiatric disorders and psychopathy, substance abuse, and others that do not apply to individuals without ASD, as delayed initial diagnosis, treatment, sensory difficulties, sleep disturbances and high parental income,^{5,9,24,31} though the results are still unclear.

The implications of a higher prevalence of ASD in the JS are complex and controversial, especially in regard to criminal responsibility. It is crucial to improve the awareness of prison and other forensic personnel about ASD and offer adequate management programs to incarcerated subjects with ASD. Probably it will be necessary to create specialized teams in forensic evaluation of this type of cases. Another important question is to assess the cost-effectiveness of routine ASD screening in the correctional population. This is important not only because the diagnosis may have legal implications but also because this procedure will identify subjects requiring clinical intervention and prevent recurrence of criminal behaviours. It is also important to grant those individuals measures that could improve their integration in correctional settings, as they are at significantly risk of exploitation and abuse from other prisoners, and may also themselves present a risk to the others, as well as aid their community re-entry.^{32,33}

CONCLUSION

The current study suggests that there is a higher burden of autistic traits in the incarcerated population than in non-offenders. This stresses the fact that some sort of combination of core features seen in ASD may constitute a risk factor for offending behaviour. This does not imply that ASD subjects are more prone to offend, but rather that the liability lies in the symptoms and in the deficits found, that also can be present, to some extent, in their peers, and so, one should focus on the person and not generalise it to the group. This study did not establish any particular crime linked to higher number of autistic traits, neither found any difference between early contacts with the JS, more incarcerations or other convictions. The prevalence of ASD in the Penitentiary of Coimbra, based on the AQ was 2.97%. This result needs to be confirmed by the evaluation of those prisoners by a psychiatrist, but it is in accordance with other studies, implying that ASD is not remarkably overrepresented in prisons.

It is important to compare ASD and non-ASD offenders, and against the general population, to find a common background in order to establish therapies to prevent criminality and recidivism, that may be even useful in non-ASD offenders with a high amount of autistic traits. Given the implications of an overrepresentation of ASD in forensic settings, future studies should try to clarify the reason behind it, even though they are no more prone to offend, explore risk and promoting factors of criminality in ASD, which therapies could be invested to prevent it and what is the proper management of ASD offenders inside the JS.

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APPENDIX I

The Adult Autism Spectrum Quotient (AQ) Ages 16+

SPECIMEN, FOR RESEARCH USE ONLY.

For full details, please see:

S. Baron-Cohen, S. Wheelwright, R. Skinner, J. Martin and E. Clubley, (2001)
[The Autism Spectrum Quotient \(AQ\) : Evidence from Asperger Syndrome/High Functioning Autism, Males and Females, Scientists and Mathematicians](#)
Journal of Autism and Developmental Disorders 31:5-17

Name:..... Sex:.....

Date of birth:..... Today's Date.....

How to fill out the questionnaire

Below are a list of statements. Please read each statement very carefully and rate how strongly you agree or disagree with it by circling your answer.

DO NOT MISS ANY STATEMENT OUT.

Examples

E1. I am willing to take risks.	definitely agree	slightly agree	slightly disagree	definitely disagree
E2. I like playing board games.	definitely agree	slightly agree	slightly disagree	definitely disagree
E3. I find learning to play musical instruments easy.	definitely agree	slightly agree	slightly disagree	definitely disagree
E4. I am fascinated by other cultures.	definitely agree	slightly agree	slightly disagree	definitely disagree

1. I prefer to do things with others rather than on my own.	definitely agree	slightly agree	slightly disagree	definitely disagree
2. I prefer to do things the same way over and over again.	definitely agree	slightly agree	slightly disagree	definitely disagree
3. If I try to imagine something, I find it very easy to create a picture in my mind.	definitely agree	slightly agree	slightly disagree	definitely disagree
4. I frequently get so strongly absorbed in one thing that I lose sight of other things.	definitely agree	slightly agree	slightly disagree	definitely disagree
5. I often notice small sounds when others do not.	definitely agree	slightly agree	slightly disagree	definitely disagree
6. I usually notice car number plates or similar strings of information.	definitely agree	slightly agree	slightly disagree	definitely disagree
7. Other people frequently tell me that what I've said is impolite, even though I think it is polite.	definitely agree	slightly agree	slightly disagree	definitely disagree
8. When I'm reading a story, I can easily imagine what the characters might look like.	definitely agree	slightly agree	slightly disagree	definitely disagree
9. I am fascinated by dates.	definitely agree	slightly agree	slightly disagree	definitely disagree
10. In a social group, I can easily keep track of several different people's conversations.	definitely agree	slightly agree	slightly disagree	definitely disagree
11. I find social situations easy.	definitely agree	slightly agree	slightly disagree	definitely disagree
12. I tend to notice details that others do not.	definitely agree	slightly agree	slightly disagree	definitely disagree
13. I would rather go to a library than a party.	definitely agree	slightly agree	slightly disagree	definitely disagree
14. I find making up stories easy.	definitely agree	slightly agree	slightly disagree	definitely disagree
15. I find myself drawn more strongly to people than to things.	definitely agree	slightly agree	slightly disagree	definitely disagree
16. I tend to have very strong interests which I get upset about if I can't pursue.	definitely agree	slightly agree	slightly disagree	definitely disagree
17. I enjoy social chit-chat.	definitely agree	slightly agree	slightly disagree	definitely disagree
18. When I talk, it isn't always easy for others to get a word in edgeways.	definitely agree	slightly agree	slightly disagree	definitely disagree

19. I am fascinated by numbers.	definitely agree	slightly agree	slightly disagree	definitely disagree
20. When I'm reading a story, I find it difficult to work out the characters' intentions.	definitely agree	slightly agree	slightly disagree	definitely disagree
21. I don't particularly enjoy reading fiction.	definitely agree	slightly agree	slightly disagree	definitely disagree
22. I find it hard to make new friends.	definitely agree	slightly agree	slightly disagree	definitely disagree
23. I notice patterns in things all the time.	definitely agree	slightly agree	slightly disagree	definitely disagree
24. I would rather go to the theatre than a museum.	definitely agree	slightly agree	slightly disagree	definitely disagree
25. It does not upset me if my daily routine is disturbed.	definitely agree	slightly agree	slightly disagree	definitely disagree
26. I frequently find that I don't know how to keep a conversation going.	definitely agree	slightly agree	slightly disagree	definitely disagree
27. I find it easy to "read between the lines" when someone is talking to me.	definitely agree	slightly agree	slightly disagree	definitely disagree
28. I usually concentrate more on the whole picture, rather than the small details.	definitely agree	slightly agree	slightly disagree	definitely disagree
29. I am not very good at remembering phone numbers.	definitely agree	slightly agree	slightly disagree	definitely disagree
30. I don't usually notice small changes in a situation, or a person's appearance.	definitely agree	slightly agree	slightly disagree	definitely disagree
31. I know how to tell if someone listening to me is getting bored.	definitely agree	slightly agree	slightly disagree	definitely disagree
32. I find it easy to do more than one thing at once.	definitely agree	slightly agree	slightly disagree	definitely disagree
33. When I talk on the phone, I'm not sure when it's my turn to speak.	definitely agree	slightly agree	slightly disagree	definitely disagree
34. I enjoy doing things spontaneously.	definitely agree	slightly agree	slightly disagree	definitely disagree
35. I am often the last to understand the point of a joke.	definitely agree	slightly agree	slightly disagree	definitely disagree
36. I find it easy to work out what someone is thinking or feeling just by looking at their face.	definitely agree	slightly agree	slightly disagree	definitely disagree
37. If there is an interruption, I can switch back to what I was doing very quickly.	definitely agree	slightly agree	slightly disagree	definitely disagree

38. I am good at social chit-chat.	definitely agree	slightly agree	slightly disagree	definitely disagree
39. People often tell me that I keep going on and on about the same thing.	definitely agree	slightly agree	slightly disagree	definitely disagree
40. When I was young, I used to enjoy playing games involving pretending with other children.	definitely agree	slightly agree	slightly disagree	definitely disagree
41. I like to collect information about categories of things (e.g. types of car, types of bird, types of train, types of plant, etc.).	definitely agree	slightly agree	slightly disagree	definitely disagree
42. I find it difficult to imagine what it would be like to be someone else.	definitely agree	slightly agree	slightly disagree	definitely disagree
43. I like to plan any activities I participate in carefully.	definitely agree	slightly agree	slightly disagree	definitely disagree
44. I enjoy social occasions.	definitely agree	slightly agree	slightly disagree	definitely disagree
45. I find it difficult to work out people's intentions.	definitely agree	slightly agree	slightly disagree	definitely disagree
46. New situations make me anxious.	definitely agree	slightly agree	slightly disagree	definitely disagree
47. I enjoy meeting new people.	definitely agree	slightly agree	slightly disagree	definitely disagree
48. I am a good diplomat.	definitely agree	slightly agree	slightly disagree	definitely disagree
49. I am not very good at remembering people's date of birth.	definitely agree	slightly agree	slightly disagree	definitely disagree
50. I find it very easy to play games with children that involve pretending.	definitely agree	slightly agree	slightly disagree	definitely disagree

**Developed by:
The Autism Research Centre
University of Cambridge**

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The Adult Autism Spectrum Quotient (AQ)

Ages 16+: Scoring Key

For full details, please see:

S. Baron-Cohen, S. Wheelwright, R. Skinner, J. Martin and E. Clubley, (2001)

[The Autism Spectrum Quotient \(AQ\) : Evidence from Asperger Syndrome/High Functioning Autism, Males and Females, Scientists and Mathematicians](#)

Journal of Autism and Developmental Disorders 31:5-17

Responses that score 1 point are marked. Other responses score 0. For total score, sum all items.

		definitely agree	slightly agree	slightly disagree	definitely disagree
1.	I prefer to do things with others rather than on my own.			1	1
2.	I prefer to do things the same way over and over again.	1	1		
3.	If I try to imagine something, I find it very easy to create a picture in my mind.			1	1
4.	I frequently get so strongly absorbed in one thing that I lose sight of other things.	1	1		
5.	I often notice small sounds when others do not.	1	1		
6.	I usually notice car number plates or similar strings of information.	1	1		
7.	Other people frequently tell me that what I've said is impolite, even though I think it is polite.	1	1		
8.	When I'm reading a story, I can easily imagine what the characters might look like.			1	1
9.	I am fascinated by dates.	1	1		
10.	In a social group, I can easily keep track of several different people's conversations.			1	1
11.	I find social situations easy.			1	1
12.	I tend to notice details that others do not.	1	1		

		definitely agree	slightly agree	slightly disagree	definitely disagree
13.	I would rather go to a library than a party.	1	1		
14.	I find making up stories easy.			1	1
15.	I find myself drawn more strongly to people than to things.			1	1
16.	I tend to have very strong interests which I get upset about if I can't pursue.	1	1		
17.	I enjoy social chit-chat.			1	1
18.	When I talk, it isn't always easy for others to get a word in edgeways.	1	1		
19.	I am fascinated by numbers.	1	1		
20.	When I'm reading a story, I find it difficult to work out the characters' intentions.	1	1		
21.	I don't particularly enjoy reading fiction.	1	1		
22.	I find it hard to make new friends.	1	1		
23.	I notice patterns in things all the time.	1	1		
24.	I would rather go to the theatre than a museum.			1	1
25.	It does not upset me if my daily routine is disturbed.			1	1
26.	I frequently find that I don't know how to keep a conversation going.	1	1		
27.	I find it easy to "read between the lines" when someone is talking to me.			1	1
28.	I usually concentrate more on the whole picture, rather than the small details.			1	1
29.	I am not very good at remembering phone numbers.			1	1
30.	I don't usually notice small changes in a situation, or a person's appearance.			1	1
31.	I know how to tell if someone listening to me is getting bored.			1	1

32.	I find it easy to do more than one thing at once.			1	1
		definitely agree	slightly agree	slightly disagree	definitely disagree
33.	When I talk on the phone, I'm not sure when it's my turn to speak.	1	1		
34.	I enjoy doing things spontaneously.			1	1
35.	I am often the last to understand the point of a joke.	1	1		
36.	I find it easy to work out what someone is thinking or feeling just by looking at their face.			1	1
37.	If there is an interruption, I can switch back to what I was doing very quickly.			1	1
38.	I am good at social chit-chat.			1	1
39.	People often tell me that I keep going on and on about the same thing.	1	1		
40.	When I was young, I used to enjoy playing games involving pretending with other children.			1	1
41.	I like to collect information about categories of things (e.g. types of car, types of bird, types of train, types of plant, etc.).	1	1		
42.	I find it difficult to imagine what it would be like to be someone else.	1	1		
43.	I like to plan any activities I participate in carefully.	1	1		
44.	I enjoy social occasions.			1	1
45.	I find it difficult to work out people's intentions.	1	1		
46.	New situations make me anxious.	1	1		
47.	I enjoy meeting new people.			1	1
48.	I am a good diplomat.			1	1
49.	I am not very good at remembering people's date of birth.			1	1
50.	I find it very easy to play games with children			1	1

	that involve pretending.				
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APPENDIX II

QA - Quociente de Espectro Autista Versão Adultos (16+ anos)

Simon Baron-Cohen, Sally Wheelwright, Richard Skinner,
Joanne Martin and Emma Clubley, 2001 ¹

Adaptação portuguesa de São Luís Castro e César F. Lima ²

*Complete por favor as informações abaixo e depois leia as instruções.
Todas as informações dadas serão estritamente confidenciais.*

Nome: Sexo:.....

Data de nascimento: Data de hoje:

Como preencher este questionário

Eis uma lista de situações. Leia cada uma delas com atenção e assinale em que medida está ou não de acordo, fazendo um círculo em torno da resposta como nos exemplos abaixo.

Para que este questionário seja válido, é preciso responder a todas as questões. Por favor não deixe nenhuma sem responder.

Exemplos

E1. Estou sempre pronto/pronta a arriscar.

concordo muito concordo pouco **discordo pouco** discordo muito

E2. Gosto de jogos de mesa.

concordo muito **concordo pouco** discordo pouco discordo muito

E3. Tenho facilidade em aprender a tocar um instrumento musical.

concordo muito concordo pouco discordo pouco **discordo muito**

E4. As culturas diferentes fascinam-me.

concordo muito concordo pouco discordo pouco discordo muito

¹ ~~S. Baron-Cohen, S. Wheelwright, R. Skinner, J. Martin and E. Clubley (2001). The Autism Spectrum Quotient (AQ): Evidence from Asperger syndrome/high functioning autism, males and females, scientists and mathematicians. *Journal of Autism and Developmental Disorders* 31, 5-17.~~

² Laboratório de Fala, Faculdade de Psicologia e de Ciências da Educação da Universidade do Porto (www.fpce.up.pt/labfala; labfala@fpce.up.pt). Versão Maio 2010.

1. Prefiro fazer coisas com outras pessoas em vez de sozinho/sozinha.	concordo muito	concordo pouco	discordo pouco	discordo muito
2. Prefiro fazer sempre tudo da mesma maneira.	concordo muito	concordo pouco	discordo pouco	discordo muito
3. Quando tento imaginar algo, tenho muita facilidade em criar imagens mentais.	concordo muito	concordo pouco	discordo pouco	discordo muito
4. Muitas vezes fico tão absorvido/absorvida numa coisa que perco de vista tudo o resto.	concordo muito	concordo pouco	discordo pouco	discordo muito
5. Noto muitas vezes pequenos ruídos que passam despercebidos às outras pessoas.	concordo muito	concordo pouco	discordo pouco	discordo muito
6. Costumo prestar atenção às matrículas dos automóveis ou a outras informações do mesmo género.	concordo muito	concordo pouco	discordo pouco	discordo muito
7. Dizem-me muitas vezes que cometi uma indelicadeza quando me parece que fui bem educado/educada.	concordo muito	concordo pouco	discordo pouco	discordo muito
8. Quando leio uma história, consigo imaginar facilmente o aspecto das personagens.	concordo muito	concordo pouco	discordo pouco	discordo muito
9. Tenho fascínio por datas.	concordo muito	concordo pouco	discordo pouco	discordo muito
10. Quando estou em grupo, tenho facilidade em seguir várias conversas ao mesmo tempo.	concordo muito	concordo pouco	discordo pouco	discordo muito
11. Para mim são fáceis as situações sociais.	concordo muito	concordo pouco	discordo pouco	discordo muito
12. Tenho tendência a notar detalhes em que os outros não reparam.	concordo muito	concordo pouco	discordo pouco	discordo muito
13. Prefiro ir a uma biblioteca mais do que a uma festa.	concordo muito	concordo pouco	discordo pouco	discordo muito
14. Facilmente invento histórias.	concordo muito	concordo pouco	discordo pouco	discordo muito
15. Atraem-me mais as pessoas do que as coisas.	concordo muito	concordo pouco	discordo pouco	discordo muito
16. Tendo a ter interesses fortes, e fico incomodado/incomodada se não posso dedicar-me a eles.	concordo muito	concordo pouco	discordo pouco	discordo muito
17. Gosto de estar à conversa.	concordo muito	concordo pouco	discordo pouco	discordo muito
18. Quando estou a falar, é difícil os outros tomarem a palavra.	concordo muito	concordo pouco	discordo pouco	discordo muito
19. Adoro números.	concordo muito	concordo pouco	discordo pouco	discordo muito

20. Quando leio uma história, acho difícil perceber as intenções das personagens.	concordo muito	concordo pouco	discordo pouco	discordo muito
21. Não aprecio muito ler romances.	concordo muito	concordo pouco	discordo pouco	discordo muito
22. Para mim é difícil fazer novos amigos.	concordo muito	concordo pouco	discordo pouco	discordo muito
23. Estou sempre a reparar em padrões regulares naquilo que me rodeia.	concordo muito	concordo pouco	discordo pouco	discordo muito
24. Aprecio mais ir ao teatro do que ir a um museu.	concordo muito	concordo pouco	discordo pouco	discordo muito
25. Não me incomoda se houver alguma perturbação nos meus hábitos diários.	concordo muito	concordo pouco	discordo pouco	discordo muito
26. Reparo muitas vezes que não sei como manter uma conversa.	concordo muito	concordo pouco	discordo pouco	discordo muito
27. Acho fácil “ler nas entrelinhas” quando falam comigo.	concordo muito	concordo pouco	discordo pouco	discordo muito
28. Normalmente concentro-me mais na imagem de conjunto e não nos detalhes.	concordo muito	concordo pouco	discordo pouco	discordo muito
29. Não sou muito bom/boa a lembrar-me de números de telefone.	concordo muito	concordo pouco	discordo pouco	discordo muito
30. Geralmente não reparo em pequenas mudanças numa situação, nem no aspecto de uma pessoa.	concordo muito	concordo pouco	discordo pouco	discordo muito
31. Dou-me conta se a pessoa com quem estou a falar fica entediada (acha maçador).	concordo muito	concordo pouco	discordo pouco	discordo muito
32. É fácil fazer mais do que uma coisa ao mesmo tempo.	concordo muito	concordo pouco	discordo pouco	discordo muito
33. Quando estou ao telefone, não tenho a certeza de quando é a minha vez de falar.	concordo muito	concordo pouco	discordo pouco	discordo muito
34. Gosto de fazer as coisas espontaneamente, sem planos.	concordo muito	concordo pouco	discordo pouco	discordo muito
35. Muitas vezes sou o último a perceber o sentido de uma piada.	concordo muito	concordo pouco	discordo pouco	discordo muito
36. É fácil para mim perceber o que uma pessoa está a pensar ou a sentir apenas olhando para a sua cara.	concordo muito	concordo pouco	discordo pouco	discordo muito
37. Se há alguma interrupção, rapidamente consigo voltar ao que estava a fazer.	concordo muito	concordo pouco	discordo pouco	discordo muito
38. Sou um bom conversador / uma boa conversadora.	concordo muito	concordo pouco	discordo pouco	discordo muito
39. Dizem-me muitas vezes que estou sempre a insistir na mesma coisa.	concordo muito	concordo pouco	discordo pouco	discordo muito

40. Quando era criança, gostava de brincar com os colegas a jogos de faz-de-conta.	concordo muito	concordo pouco	discordo pouco	discordo muito
41. Gosto de coleccionar informação sobre tipos de coisas (por exemplo, tipos de carros, aves, comboios, plantas).	concordo muito	concordo pouco	discordo pouco	discordo muito
42. Tenho dificuldade em imaginar-me na pele de outra pessoa.	concordo muito	concordo pouco	discordo pouco	discordo muito
43. Gosto de planear com cuidado todas as actividades em que participo.	concordo muito	concordo pouco	discordo pouco	discordo muito
44. Gosto de acontecimentos sociais.	concordo muito	concordo pouco	discordo pouco	discordo muito
45. Tenho dificuldade em perceber quais são as intenções das outras pessoas.	concordo muito	concordo pouco	discordo pouco	discordo muito
46. As situações novas causam-me ansiedade.	concordo muito	concordo pouco	discordo pouco	discordo muito
47. Gosto de conhecer pessoas novas.	concordo muito	concordo pouco	discordo pouco	discordo muito
48. Tenho bom sentido diplomático.	concordo muito	concordo pouco	discordo pouco	discordo muito
49. Não sou muito bom/boa a lembrar-me dos dias de anos.	concordo muito	concordo pouco	discordo pouco	discordo muito
50. Tenho muita facilidade em fazer jogos de faz-de-conta com crianças.	concordo muito	concordo pouco	discordo pouco	discordo muito

Obrigado por ter preenchido este questionário.

♥ MRC-SBC/SJW - Versão portuguesa de São Luís Castro e César F. Lima. Revisto a Maio 2010 (primeira versão de Fevereiro de 2009).