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FUNCIONALIDADE EM ADULTOS COM TRANSTORNO DO ESPECTRO AUTISTA:

relações entre traços autísticos, variáveis psicossociais e funcionamento cognitivo

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Funcionalidade em Adultos com Transtorno do Espetro Autista: relações entre traços autísticos, variáveis psicossociais e funcionamento cognitivo

ANA LUIZA COSTA ALVES

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RESUMO

Pessoas com o diagnóstico de Transtorno do Espectro Autista (TEA) apresentam dificuldades em relação a interação social e inflexibilidade comportamental, manifestos por prejuízos na compreensão social, comunicação e presença de comportamentos que podem ser restritos, repetitivos e/ou estereotipados. A presença desses traços varia em quantidade e intensidade, sendo assim, atualmente entende-se o transtorno dentro de uma visão dimensional. Portanto, é possível encontrar pessoas com autismo que apresentem sintomas severos e por isso necessitam de muito suporte, bem como pessoas que manifestam traços mais leves e consequentemente, menos prejuízos. Estas pessoas, consideradas pelo DSM-5 como autistas "nível 1", foram o foco do presente estudo. Tivemos como objetivos: 1) realizar análise descritiva da Escala Quociente do Espectro do Autismo em uma amostra heterogênea brasileira, trata-se de uma escala que visa auxiliar o diagnóstico de casos com sintomatologia branda e 2) verificar sua precisão no diagnóstico de adultos; 3) caracterizar o perfil neurocognitivo de adultos com diagnóstico de TEA e com alto funcionamento; 4) além do perfil psicossocial; 5) e funcional desses indivíduos; 6) compreender as relações existentes entre sintomas de autismo, funcionamento psicossocial, cognitivo e adaptativo. Para isso, dividimos o estudo em três fases. Nas primeiras duas fases, utilizamos uma plataforma online para coleta de dados e obtivemos 1.024 voluntários. Em seguida, avaliamos via internet 157 adultos com TEA e 119 adultos com desenvolvimento neurotípico, e posteriormente 29 adultos com TEA e 19 controles presencialmente. Nossos resultados sugerem que traços de autismo e funcionalidade se correlacionam com todas as variáveis psicológicas investigadas: sintomas de depressão, ansiedade e TDAH, satisfação com a vida, falhas cognitivas, amor romântico e percepção facial/emocional. Além disso, também se correlacionam com memória operacional verbal e visuoespacial, e memória de longo prazo. Houve diferenças entre os grupos em todas as variáveis psicológicas, mas não houve em relação ao desempenho cognitivo. O estudo de autismo em adultos vem crescendo nos últimos anos e isso se faz necessário, visto que compreender as principais dificuldades e possíveis potencialidades dessa população promove melhor qualidade de vida, satisfação e quando necessário, possibilita a escolha de intervenções que sejam mais adequadas.

Palavras chaves: Autismo, funcionalidade, cognição, variáveis psicológicas

ABSTRACT

People diagnosed with Autism Spectrum Disorder (ASD) present difficulties with social interaction and behavioral inflexibility, manifested by impairments in social understanding, communication and behaviors that may be restricted, repetitive and/or stereotyped. The presence of these traits varies in quantity and intensity, in this way, the disorder is now understood within a dimensional vision. Thus, it is possible to find people with autism who presents with severe symptoms and therefore needs more support, as well as people who manifest milder traits and consequently fewer impairments. These individuals, considered by DSM-5 as autistic "level 1", were the focus of the present study. We aimed to: 1) perform a descriptive analysis of the Autism Spectrum Quotient Scale in a heterogeneous Brazilian sample, it is a scale that aims to support the diagnosis of cases with mild symptoms, and 2) verify their accuracy in the diagnosis of adults; 3) to characterize the neurocognitive profile of adults diagnosed with ASD and with high functioning; 4) also the psychosocial profile; 5) and functional of these individuals; 6) understand the relationship between autism symptoms, psychosocial, cognitive and adaptive functioning. For this, we divided the study into three phases. In the first two phases, we used an online platform for data collection and obtained 1,024 volunteers. Then, we evaluated 157 adults with ASD and 119 adults with neurotypical development, and 29 adults with ASD and 19 controls personally. Our results suggest that autism traits and functionality correlate with all the psychological variables investigated: symptoms of depression, anxiety and ADHD, satisfaction with life, cognitive failures, romantic love and facial/emotional perception. They also correlate with verbal and visuospatial working memory, and long-term memory. There were differences between groups in all psychological variables, but there was no difference in cognitive performance. The study of autism in adults has been growing in recent years and this is necessary because understanding the main difficulties and possible potentialities of this population promotes a better quality of life, satisfaction and when necessary, allows the choice of interventions that are more adequate.

Keywords: Autism, functionality, cognition, psychological variables

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SUMÁRIO

1. INTRODUÇÃO

Os Transtornos do Espectro Autista (TEA) são transtornos do neurodesenvolvimento que apresentam prevalência de 1:160 indivíduos, segundo a Organização Mundial da Saúde (OMS). Os sintomas manifestam-se precocemente e seguem o curso de vida do indivíduo gerando prejuízos funcionais importantes. O espectro autista é definido por dois grandes conjuntos de sintomas, sendo eles: déficits na sociabilidade e padrões restritos, estereotipados e rígidos de interesses, comportamentos ou atividades (American Psychiatric Association - APA, 2013). Estes sintomas podem se manifestar através da presença de alterações no desenvolvimento da linguagem, déficits na comunicação verbal e não verbal, prejuízos na habilidade social, possível déficit intelectual, déficits cognitivos e dificuldades motoras.

As manifestações do TEA são múltiplas e a combinação dos sintomas característicos do autismo junto a outras comorbidades, perfis cognitivos, comportamentais e funcionais, resulta em um dos transtornos mais heterogêneos associados ao neurodesenvolvimento (Foss-Feig et al., 2015; Doernberg & Hollander, 2016). Dessa forma, indivíduos com a mesma condição nosológica podem apresentar sintomas que variam em termos de quantidade, intensidade e, consequentemente, prejuízos **(**Tantam, 2003; Cederlund et al., 2011).

A Síndrome de Asperger e o Autismo de alto funcionamento compreendem as manifestações mais leves dentro do espectro autista, sendo que a partir da 5ª Edição do Manual Diagnóstico e Estatístico dos transtornos Mentais (DSM-V), a Síndrome de Asperger (SA) passou a ser considerada um transtorno pertencente ao espectro autista. Os indivíduos com essa síndrome apresentam os sintomas comuns aos demais indivíduos com TEA, porém não possuem deficiência intelectual ou na linguagem, o que lhes possibilita uma adaptação funcional consideravelmente superior aos indivíduos com autismo clássico (Barahona-Corrêa & Filipe, 2016). Embora apresentem mais dificuldades se comparados a indivíduos com desenvolvimento típico, muitos adultos com a Síndrome de Asperger são capazes de exercer atividades laborais e intelectuais com bom desempenho (Hurlbutt & Chalmers, 2004). Estes aspectos lhes conferem melhor qualidade de vida, e por consequência, melhora do quadro clínico (Howlin et al., 2005). Apesar disso, esses indivíduos relatam prejuízos relacionados principalmente a interação social, como dificuldades para desenvolver ou manter relacionamentos afetivos, compartilhar interesses, compreender e descrever expressões faciais e sentimentos próprios e de outras pessoas (Hill et al., 2004). Esses prejuízos são observados principalmente quando é exigido deles habilidade social e flexibilidade cognitiva (Engstrom et al., 2003).

A OMS, por meio da classificação internacional da funcionalidade, recomenda que a funcionalidade dos pacientes com diferentes condições clínicas seja avaliada considerando os domínios cognição, mobilidade, autocuidado, interação social, atividades de vida diária e participação em atividades comunitárias (Üstün et al., 2010). Desses, à exceção do domínio mobilidade, é esperado que pacientes com autismo apresentem dificuldades maiores ou menores na adaptação em múltiplos aspectos da funcionalidade. Acredita-se que diferentes fatores podem influenciar a capacidade funcional de pessoas com autismo, como a presença e a intensidade dos próprios traços autísticos, variáveis psicológicas e sociais, como comorbidades psiquiátricas, comportamento hiperativo e impulsivo, satisfação com a vida, e teoria da mente, além de funções cognitivas, como inteligência, memória, funções executivas e fluência verbal.

Nesse sentido, buscaremos compreender a relação entre os sintomas do transtorno do espectro autista, variáveis psicossociais e funcionalidade cognitiva. O objetivo do estudo é analisar como esses fatores podem se associar à funcionalidade, além de definir um perfil psicológico e cognitivo de adultos com autismo.

2. OBJETIVOS

2.1 Objetivo Geral

Investigar a relação entre traços de autismo, variáveis psicossociais e funcionamento cognitivo em adultos com Transtorno do Espectro Autista (TEA)

2.2 Objetivos específicos

1) Realizar análise descritiva da escala Quociente do Espectro do Autismo (QA) em uma amostra heterogênea de adultos brasileiros;
2) Investigar a precisão da QA no diagnóstico de adultos com autismo e inteligência preservada;
3) Caracterizar o perfil de desempenho em testes neuropsicológicos de adultos com diagnóstico de TEA e com alto funcionamento;
4) Caracterizar o perfil psicossocial desses indivíduos;
5) Caracterizar o perfil funcional desses indivíduos;
6) Analisar as relações entre sintomas de TEA, funcionamento cognitivo e aspectos psicossociais.

3. MÉTODO

3.1 Considerações éticas

O estudo que embasou essa dissertação compreende um projeto mais abrangente que visa identificar o perfil psicológico e funcional de adultos com transtorno do espectro autista e seus preditores. O estudo foi encaminhado e aprovado pelo Comitê de Ética em Pesquisa da Universidade Federal de Minas Gerais (CAEE: 56534516.1.0000.5149). Os participantes deram consentimento por meio virtual ou presencial em diferentes fases do estudo. O projeto encontra-se de acordo com as diretrizes do Conselho Nacional de Saúde e da Declaração de Helsinki.

3.2 Desenho e local do estudo

O estudo apresenta desenho transversal e foi feito em três fases distintas. A primeira e segunda fases envolveram o uso de uma plataforma virtual desenvolvida no aplicativo *Googleforms* (Figura 1) para a aplicação de escalas e questionários, e contou com participantes de todas as regiões brasileiras. Posteriormente alguns dos participantes foram convidados a realizar uma entrevista presencial, nas dependências do Centro de Tecnologia em Medicina Molecular da UFMG. Os participantes desse último estágio eram residentes de Belo Horizonte ou cidades vizinhas.

Figura 1: Plataforma online utilizada para a coleta de dados nas fases 1 e 2 do estudo

A avaliação via internet foi selecionada de forma a reduzir o custo e viabilizar a pesquisa dado o tempo relativamente curto para a identificação de um grupo clínico relativamente incomum - prevalência estimada de 1% - (APA, 2013). Estudos internacionais utilizando tal metodologia para avaliação psicológica, como sintetizado por Hoerguer e colaboradores (2011), sugerem boa equivalência no uso de testes e escalas em ambiente virtual, desde que os métodos de aplicação ou resposta sejam condizentes com esse contexto. Experiências anteriores de nosso grupo, incluindo o uso de alguns dos instrumentos utilizados nesse estudo, atestam a boa concordância entre o uso de questionários e escalas em ambiente virtual com as aplicações tradicionais realizadas presencialmente (de Paula, 2015; de Paula et al., 2017; 2018).

As avaliações presenciais foram realizadas de forma a confirmar ou refutar o possível diagnóstico de TEA de parte dos participantes e realizar demais procedimentos que não mantém boa validade ou confiabilidade quando utilizados em ambiente virtual. Os últimos procedimentos foram realizados pela autora da presente dissertação, orientado diretamente por um médico psiquiatra e um psicólogo experientes no diagnóstico e avaliação do transtorno do espectro autista. A aplicação dos testes neuropsicológicos a serem descritos foi realizada por equipe de alunos de graduação capacitados no protocolo sob supervisão direta da autora.

3.3 Participantes e procedimentos de avaliação

A primeira fase do projeto contou com a participação de 1.024 voluntários de diferentes regiões do país. O objetivo da primeira fase do estudo foi identificar participantes que expressassem maiores traços de autismo, o que é sugestivo da presença do transtorno quando o consideramos em uma perspectiva dimensional (APA, 2013).

Esses participantes responderam à escala *Autism Quotient* (Quociente Autista), desenvolvida por Baron-Cohen e colaboradores (2011) para a detecção de quadros sutis de autismo em adultos. A escala é uma das mais utilizadas internacionalmente para tal fim, como revisado por Ruzich e colaboradores (2015). Um estudo de validação para a população brasileira foi realizado por Egito e colaboradores (2018). A escala é composta por cinquenta perguntas destinadas a mensurar diferentes comportamentos, crenças ou experiências típicas de pessoas com autismo (Anexo). Para cada pergunta o sujeito responde em uma escala de quatro pontos o quanto concorda ou discorda com cada uma das perguntas. No critério de correção tradicional, adotado no presente estudo, as respostas para cada item são dicotomizadas (sintomático x típico) e somadas em um escore total. Estudos internacionais sugerem que esse

escore distingue com boa acurácia pessoas neurotípicas (que apresentam em médica 16 pontos na escala) de pessoas com TEA (que apresentam em médica 34 pontos na escala), em diferentes países e culturas (Ruzich et al., 2015). O ponto de corte 31/32 (controle/caso) é o mais utilizado para a detecção de TEA, e foi adotado em nosso estudo (Lai & Baron-Cohen, 2015).

Além do *Autism Quotient* os participantes preencheram uma ficha de dados sociodemográficos (incluindo idade, escolaridade, histórico de saúde, uso de medicações e condição socioeconômica) e a um questionário de saúde mental, o Self-Reporting Questionnaire 20 (Mari & Williams, 1985). Essa escala de vinte perguntas avalia a presença de sintomas psiquiátricos não psicóticos, sobretudo ligados a depressão e ansiedade, sendo sensível à detecção de diferentes transtornos mentais (Gonçalves et al., 2008).

Participantes selecionados na primeira fase foram convidados por e-mail à participação na fase dois do estudo. Nesta, houve a participação de 276 voluntários, divididos em dois grupos: 119 adultos neurotípicos (sem histórico de doenças neurológicas ou transtornos do neurodesenvolvimento, sem traços significativos de autismo e com escore na SRQ-20 pouco sugestivo de transtornos mentais) compondo o grupo controle e 157 adultos previamente diagnosticados com autismo ou que apresentaram escore clínico (QA>31) na escala do Quociente do Espectro do Autismo.

Os seguintes critérios de exclusão foram considerados para os propósitos desta pesquisa: *Grupo autismo*: diagnóstico de transtorno do espectro autista em gravidade moderada ou severa, presença de deficiência intelectual, doenças neurológicas ou de qualquer outra condição que impedisse a participação no projeto. *Grupo controle*: presença de deficiência intelectual, doenças neurológicas ou de qualquer outra condição que impedisse a participação no projeto. O diagnóstico dos pacientes foi realizado considerando os critérios propostos no DSM-5.

Nessa fase foram utilizadas uma série de escalas e questionários selecionados de forma a documentar diferentes características psicológicas dos participantes (sintomas internalizantes, desatenção, hiperatividade, impulsividade, queixas cognitivas e teoria da mente), incluindo medidas psicossociais (funcionalidade, relacionamento afetivo e satisfação com vida), conforme os objetivos do estudo.

A terceira e última fase do projeto, contou com a participação de 19 adultos neurotípicos e 29 adultos autistas com alto funcionamento. Os participantes foram adultos brasileiros, com idade entre 18 e 60 anos, sendo que os voluntários do grupo controle foram pareados por idade, sexo, escolaridade e condição socioeconômica, selecionados dentre os participantes da fase dois do estudo. Essa etapa envolveu uma avaliação presencial onde foi realizada uma entrevista

clínica de saúde mental com base no DSM-5 (APA, 2013; Nussbam, 2015) para confirmação do diagnóstico de autismo e exclusão de participantes que não apresentassem o transtorno, além da aplicação de outros testes e escalas cuja aplicação via internet seria enviesada.

Os testes em questão foram selecionados de forma a documentar grandes áreas do funcionamento neurocognitivo: linguagem, processamento espacial, funções executivas, velocidade de processamento, memória episódica, memória de trabalho, inteligência e tomada de decisões. Todos os instrumentos da terceira fase foram previamente adaptados e validados ao contexto brasileiro.

O quadro a seguir sintetiza todos os procedimentos de avaliação descritos anteriormente, incluindo suas referências originais e adaptações brasileiras. A descrição dos participantes do estudo será realizada posteriormente, ao detalharmos os dois estudos que compõem a dissertação.

Quadro 1: procedimentos de avaliação adotados em diferentes fases da pesquisa

Fase	Aspecto Avaliado	Instrumento	Referência Original	Adaptação Brasileira
1	Sintomas de Autismo	Autism Quotient	Baron-Cohen et al. (2001a)	Egito et al. (2018)
	Saúde Mental	Self-Reporting Questionnaire 20	Mari & Williams (1985)	Gonçalves et al. (2008)
	Socioeconômico	*Critério Brasil*	ABEP (2008)	-
2	Funcionalidade	WHO Disability Assement 2.0	Üstün et al. (2010)	Silveira et al. (2013)
	Satisfaction with life	Satisfaction with life Scale	Diener et al. (1985)	Hutz et al. (2014)
	Impulsividade	Abrv. Barrat Impulsiveness Scale	Coutlee et al. (1985)	De Paula & Costa (in press)
	Sintomas de TDAH	Adult Self-Report Scale (ADHD)	Kessler et al. (2005)	Leite (2011)
	Queixas Cognitivas	Cognitive Failures Questionnaire	Broadbent et al. (1982)	de Paula et al. (2018)
	Amor Apaixonado	Passionate Love Scale	Hatfield & Sprecher (1998)	Hernandez (2016)
	Teoria da Mente	Read the Mind in the Eyes	Baron-Cohen et al. (2001b)	Sanvicente-Vieira et al. (2014)
3	Diagnóstico de Autismo	Clinical interview (DSM-5)	Nussbam (2015)	Nussbam (2015)
	Saúde mental	Clinical interview (DSM-5)	Nussbam (2015)	Nussbam (2015)
		DSM-5 Transversal symptoms scale	APA (2013)	APA (2013)
	Inteligência	Vocabulary (WASI)	Wechsler (1999)	Trentini et al. (2014)
		Matrix Reasoning (WASI)	Wechsler (1999)	Trentini et al. (2014)
	Funções Executivas	Tower of London Test	Krikorian et al. (1994)	de Paula et al. (2012)
		Five Digit Test (Inhibiting, Flexibility)	Sedó (2007)	Sedó et al. (2015)
		Switching Fluency Test	de Paula et al. (2015)	de Paula et al. (2015)
		Trail Making Test (B)	Reitan (1971)	Hamdan & Hamdan (2009)
	Memória de Trabalho	Digit Span	Kessler et al. (2008)	de Paula et al. (2016)
		Corsi Block-Tapping Task	Kessler et al. (2008)	de Paula et al. (2016)
	Memória	Logical Memory	Wechsler (1945)	Nitirni (2008)
		Modified Taylor Figure Test	Hublay & Tremblay (2002)	de Paula (2018)
	Linguagem	Verbal Fluency (Animals, Fruits)	de Paula et al. (2015)	de Paula et al. (2015)
		Boston Naming Test	Goodglass et al. (1983)	Leite et al. (2017)
	Visuoespacial	Modified Taylor Figure Test	Hublay & Tremblay (2002)	de Paula (2018)
		Thalves Visual Organization Test	Alves et al. (2010)	-
	Velocidade de Processamento	Five Digit Test (Reading, Counting)	Sedó (2007)	Sedó et al. (2015)
		Trail Making Test (A)	Reitan (1971)	Hamdan & Hamdan (2009)
	Tomada de Decisões	Iowa Gabling Task	Bechara et al. (2005)	Malloy-Diniz et al. (2008)

4. RESULTADOS

Nessa sessão são apresentados os artigos *Descriptive analysis of the Autism Spectrum Quotient (AQ) in a heterogeneous sample of Brazilian adults* e *A psychological and neurocognitive profile of adults with Autism: predicting disability in high functioning patients* que em conjunto compõem os resultados da dissertação.

4.1 Descriptive analysis of the Autism Spectrum Quotient (AQ) in a heterogeneous sample of Brazilian adults

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ABSTRACT

The Autism Spectrum Disorder is characterized by the presence of difficulties in social interaction, and inflexible, repetitive and/or stereotyped behaviors and interests, and there are few tools to identify symptoms in population basis. The principal aim of the study is to present a brief descriptive analysis of the Autism Spectrum Quotient (AQ) in a heterogeneous sample of Brazilian adults with no autism diagnostic or other psychiatric symptoms to describe how the autistic traits are distributed in the general population. We investigate its accuracy in a sample with autistic adults, who presented a clinical score on the scale. The AQ is a self-report instrument, with 50 items that are divided into five different domains: social skill, imagination, communication, attention switching, and attention to details. Studies have found that it is a reliable instrument to quantify autistic traits in individuals older than 18 years old and presents an average or aboveaverage intelligence. Our findings suggest that autism traits are normally distributed in the population, but Brazilian adults (n=385) have shown a different profile from the original study. Further, we found that 24 adults from our sample (n=32) have a clinical score on the AQ, which is compatible with their previous autism diagnosis.

KEYWORDS: Autism Spectrum Disorder, Asperger syndrome, psychological assessment, psychometrics, transcultural psychology

INTRODUCTION

People with Autism Spectrum Disorder (ASD) show difficulties in two main areas: social interaction, including verbal or non-verbal communication deficits, and inflexible, repetitive and stereotyped behaviors and interests (APA, 2013). These traits are perceived in the early development of individual life and frequently impair their functionality in different domains, including daily functionality, relationships, professional life, academic outputs, and mental health. Although, besides these core symptoms, ASD is a very heterogeneous condition and might be seen as a spectrum, where people may differ in how intense are the symptoms, m which may range from a mild to the severe presentation. This aspect will determine the impairments and the kind of support the person will need.

The prevalence of ASD around the world and across all ages is approximately 1%. Besides that, some researchers consider that autism traits show a normal distribution on the typical population. Mainly difficulties with social behavior, even it's a core symptom of autism could be common in people with no such diagnosis (Constantino and Todd, 2003; Rutter, 2011). The assessment of Autism in childhood is well documented in the literature, and there are many adapted and validated clinical instruments for the assessment of those traits. However, this scenario is different when we consider the adult with autism, especially when the clinical condition is less severe, with average intelligence and none delay in language development.

With the proposal to quantify the autism traits in the individual older than 18 years old with preserved intelligence, Baron-Cohen et al. (2001) developed the Autism Spectrum Quotient (AQ), which is a self-report questionnaire with 50 items that are divided into five different domains: social skill, imagination, communication, attention switching, and attention to details. The cut-off score can identify the number of symptoms the individual present, classifying for severity, and the need and kind of support necessary. Although the diagnosis of autism should be made by a team of multidisciplinary professionals, the use of instruments and questionnaires have the objective to give support to the diagnostic process. So, the AQ scale allows to measure autism traits in the adult population and being helpful in the diagnostic process. The AQ was adapted for many cultures, including for the Brazilian Portuguese by Egito et al. (2018).

As we know the clinical importance of this instrument and the normal distribution of those traits in the general population, we aim to briefly present a descriptive analysis of AQ scores in a sample of Brazilian adults with no autism diagnostic or any other psychiatric

condition. And then, the scale was evaluated about it is accuracy in a sample with adults with ASD.

METHODS

The local ethics board approved our study. The research was organized in different stages. In the first one, we use adopted an online platform for data collection. We invited by mailing and in social media, especially in groups of researchers which work with autism and groups of autism patients and relatives, along with other people who would like to participate in research about autism, and received 1024 valid forms submissions in our server. We applied a series of exclusion criteria in this initial sample: age below 18 years, self-reported history of mental disorders or neurological diseases, use of psychotropic medication and scores above the cut-off score for mental disorders (>7) in the Self Reporting Questionnaire-20 (SRQ-20) (Mari & Williams, 1985). The final sample of this study involved 385 individual (294 women), with m age of 34.3 years (SD=11.3, range=18-68).

Then we invited part of our sample who got a clinical score (>31, the international cutoff) on the AQ or reported a previous diagnosis of ASD to a diagnostic interview following the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSMV). We invited only participants which live in our town and were interested in the procedure, as reported in our online form. This subsample was formed by 32 voluntaries (23 women), with a mean age was 33.6 (SD=8, range=20-50), years of schooling were 16.5 (SD=3.5).

Based on AQ responses, we computed descriptive parameters using standard scores and percentiles following the original (Baron-Cohen et al., 2014) and Brazilian-adapted (Egito et al., 2018) scoring systems. AQ scores showed a normal distribution according to histogram analysis, and the mean score was 20.9 (SD=8.8).

We computed descriptive data (mean, standard deviation, minimum and maximum values), normative values (using percentile scores) and assessed reliability by calculating the Cronbach`s alpha based on each scoring criteria.

RESULTS

We found a good internal consistency (α=0,85 and 0.87), which means the scale accurately measure the variable of interest in both genders. Of the total of 91 men in our first

sample, voluntaries with 32 points or more (the cut-off proposed by Baron-Cohen and colleagues) scored higher than approximately 93% of the control sample. Of 294 women, those who obtained 32 points or more, scored higher than approximately 97% of our sample (Table 1). In the original study, 32 points represent the 98th percentile (computed from the mean and standard deviations reported in the original paper). The study conducted by Osorio's examined the factor structure of the Brazilian version of the scale, and they proposed a three-factor model instead of five, a reduced version (25 items) and a different way to correct it. Besides that, they did not indicate a different cut-off for their sample. The distribution of AQ scores according to this method is shown in Table 1.

Table 1: *Descriptive data of Autism Quotient scores stratified by scoring method and sex*

	Cohen et al. (2001)		**Egito et al. (2018)**	
	Male	Female	Male	Female
Mean	25	20	62	54
Std. Dev.	8	9	12	13
Min	5	3	40	28
Max	43	45	86	94
Pc.5	5	5	40	38
Pc.10	10	7	44	41
Pc.20	14	11	47	44
Pc.30	16	13	50	46
Pc.40	18	15	52	48
Pc.50	20	17	54	50
Pc.60	22	19	56	52
Pc.70	24	21	58	54
Pc.80	27	23	60	52
Pc.90	30	27	64	59
Pc.95	34	30	66	62
Alfa de Cronbach	0.87	0.85	0.76	0.82

Pc.: Percentile

The assessment of the 32 adults which scored above the international cutoff for the AQ or had a previous diagnosis was done by the first author (ALC) and discussed with a clinical neuropsychologist (JJdP) and a psychiatrist (MARS). Based on the 32 score cutoff two of them did not present characteristics enough to receive an autism diagnostic, but showed symptoms of other mental disorders (social phobia and generalized anxiety). Six voluntaries of this group were classified as a non-clinical, and but showed borderline scores in AQ. Those results are summarized in Figure 1.

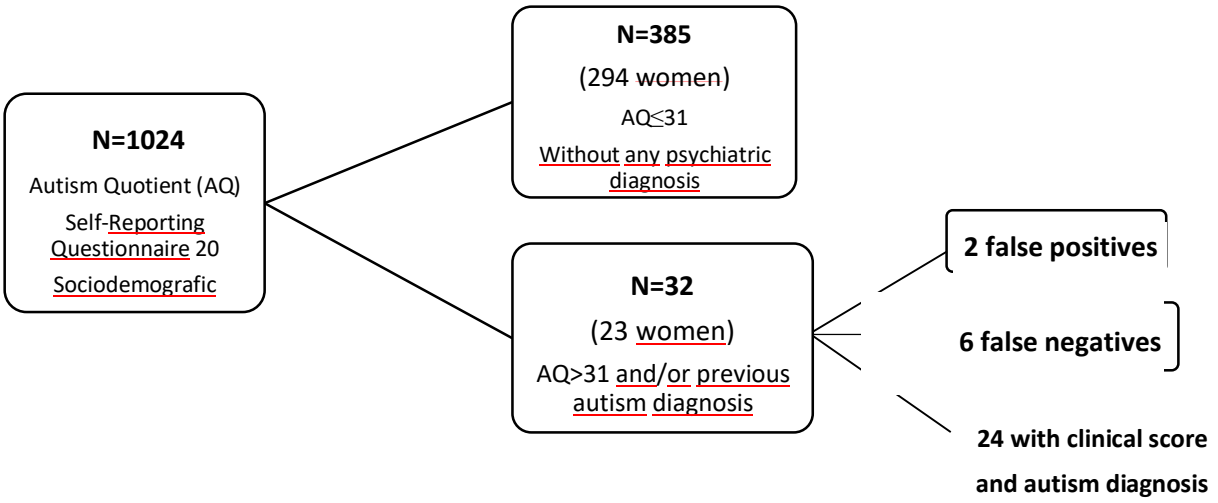

Figure 1: Study design and procedures

DISCUSSION

The Autism Spectrum Disorder used to be considered as a diagnostic category, but the last edition of DSM and recent researches have been proposing a dimension view for the clinical condition. ASD varies according to symptoms, severity, and necessity for support. It is expected that any population present from subclinical traits of ASD to a very severe condition.

As seen in other cultures AQ scores were normally distributed in our sample, and people with autism showed very high scores in the questionnaire (above the 90th percentile). AQ also showed good reliability, both on the original (Baron-Cohen et al., 2001) and adapted (Egito et al., 2018) scoring systems, Our second sample, which showed scores above the cutoff score or reported a previous diagnose of autism, we found 2 false-positive and 6 false-negative cases.

The availability of AQ as a screening instrument for autism traits in adults have huge importance, especially in the diagnostic process of adults with fewer impairments and preserved intelligence. These cases could be a challenge for health professionals. Besides that, knowing the level of the autism enables the clinical to predict the impairments, to offer adequate and quality support, also, to provide better guidance to the family. It is important to keep on mind that the scale is not enough for the diagnostic, but still very useful in the investigation.

Finally, the results of our study suggest that our population have a different profile comparing to the original study because the clinical score represents a smaller percentile in our sample, which means that probably Brazilian sample report more symptoms than others cultures. Despite this, we observe those traits distributed in the typical population. Future

searches are required to adequate the use of Autism Spectrum Quotient in the Brazilian population, as defining a cut-off score that will better consider our culture and peculiarities.

CONFLICTS OF INTEREST

The authors declare no conflict of interest

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4.2 A psychological and neurocognitive profile of adults with Autism: predicting disability in high functioning patients

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ABSTRACT

The Autism Spectrum Disorder was first mentioned around the 1940s by Leo Kanner, and initially, researchers were focused on describing the disorder in children and this tendency is still notable. However, nowadays some studies were been developed investigating autism traits and their outcomes in adulthood. Considering the importance of deepening in this knowledge and the presence of few studies with this population, our aim in this study is to provide a psychological profile of adults with ASD and high functioning, also to understand better their cognitive functions, highlighting the possible deficits and protective factors. The study was organized into three phases. In the first one, we used an online platform for data collection and we got 1.024 volunteers, then we had 157 adults with ASD and 119 adults with neurotypical development, in the last phase there were 29 adults with ASD and 19 in the control group. They were required to answer questionnaires assessing psychological measures and tests evaluating cognitive function. Our results indicate a moderate correlation between autistic traits and life satisfaction (r=-0.33), inattention (r=0.37), hyperactivity (r=0.31), functionality (r=0.48) and cognitive failures (r=0.44). Moreover, a weak correlation between impulsivity (r=0.18), passionate love (r=0.27) and facial/emotional perception (r=-0.21). No correlation was found between the autism scale and executive functions, language, long-term memory, visual abilities, and processing speed, only with visual working memory (r=0.37). Furthermore, the results suggest a significant difference between the groups in all psychological measures, with moderate effect size in life satisfaction (R=-0.35), inattention (R=-0.37), passionate love (R=0.32), cognitive failures (R=-0.39) and functionality (R=-0.49). And, a small effect size in hyperactivity (R=-0.28), impulsivity (R=-0.14) and facial/emotional perception (R=-0.16). However, no significant difference between the groups in the tests results. These findings suggest that adults with autism from our sample did not have differences in cognitive functionality compared to adults with neurotypical development. Despite that, they presented important differences regarding psychological measures.

KEYWORDS: autism spectrum disorder, function, psychological assessment, neuropsychological assessment, Asperger syndrome

INTRODUCTION

The Autism Spectrum Disorder (ASD) was first mentioned around the 1940s by the Austrian psychiatry Leo Kanner (1943) and around the 1980s, Hans Asperger publications (1991) also received acknowledgment for being one of the pioneers of autism study. Nowadays, after five editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), ASD is characterized by the presence of symptoms and difficulties in two principal areas, social communication and behavioral flexibility. The prevalence of autism is estimated around 1% in the population (APA, 2013).

People with autism show difficulties with social interaction, that include deficits in verbal and non-verbal communication, difficulty to initiate and maintain a conversation or a relationship, less eye contact, reduced interest for peers and to share emotion and interests, inappropriate social behavior, also, deficits in emotional and facial perception. In terms of behavioral flexibility, the patients often show a repetitive and restrictive pattern of interests, behaviors, and activities. These can appear through stereotyped motor behavior or speech, inflexible adherence to routine, the presence of ritualistic behaviors, hyper and restrictive focus on one object or subject and, hyper or hypo-reactivity to sensory stimuli. Those are the basic criteria for identifying the disorders, according to the most recent classification (APA, 2013).

Those traits emerge in the early development of individual life, and although there are core features, ASD is best represented as a spectrum because individuals with autism can differ into quantity and severity of the traits (Lord & Bishop, 2015). So, it's possible to exist a mild manifestation for the disorder, but also, a very severe, as operationalized as the new level classification of DSM-5. Therefore, the level of impairments and dysfunctionality have to be evaluated considering the spectrum, and consequently, this will determine the kind of support will be needed by the patient (Poon & Sidhu, 2017).

Initially, researchers were focused on describing the disorder in children and this tendency is still notable nowadays. Considering that autism is very well documented in this stage of life, there are more instruments to assess these symptoms in children and many tools were translated and validated in different languages and cultures, such as Childhood Autism Rating Scale and Screening tool for autism in two-year-old (Montecchi et al., 2004; Ousley et al., 2000). Consequently, more interventions were developed to attend their necessities and to improve quality of life.

Despite that have wasn't a priority for a long time, some studies were been developed investigating autism traits and their outcomes in adulthood. Gillberg and colleagues (2010), for example, developed a long-term prospective follow-up study with 120 individuals diagnosed with ASD in infancy and they found that in the early adulthood the majority of the group remained dependent of their parents for education and living support. They highlight the importance of improvements in activities and support for this population, also the necessity of specific tools to assess some behavioral and psychosocial factors, such as quality of life. Another follow-up study with 68 adults (mean age=29 years) with ASD, conducted by Howling et al. (2004), found similar results. The overall conclusion is that almost all the sample in adult age was still dependent on their families in adult age and just a few lived alone or have permanent employment.

There are a few systematic reviews on the topic. One of the studies, carried out by Bishop-Fitzpatrick et al. (2014), reviewed 13 studies, and found that social cognition training and applied behavior analysis were interventions with a positive effect on the treatment of adults with ASD. But they also pointed for the small number and poor quality of the studies in this area. Another systematic review with 25 studies reported outcomes in adulthood (Magiati et al., 2014) and concluded that adaptive functioning usually improved in most studies, autism symptoms were stable along years and there is the presence of some early variables, like IQ and language ability, that are associated with functioning outcome in adulthood.

Another topic studied in adults with autism is comorbid mental health disorders or other psychological problems. Although this data is inconsistent, Rutter and colleagues (2015) estimated that around 25% to over 75% of adults with autism may show have psychiatric problems. They evaluated 58 adults with ASD (mean age=44 years) whom they followed for forty years. In a total of 22, those adults who were able to report about their own mental state, 45% reported no mental problems, and 27% assumed to have symptoms related to depression, anxiety and/or obsessive-compulsive disorder. Once again, the study suggests the need of a more detailed description of the psychological function of adults with autism, using validated measures on this purpose. In 2015, Croen and colleagues observed in their sample of adults with autism (n=1507) that psychiatric problems were significantly more frequent in this population comparing to the neurotypical adults. Over than 50% patients had comorbid mental disorder and a higher rate of other medical conditions, including diabetes, seizure and hypertension.

Beyond the high frequency of some disorders, such as depression, anxiety, and Obsessive Compulsive Disorder (OCD), Attention-Deficit/Hyperactivity Disorder (ADHD) is

another frequent comorbidity in the autism population. A review study suggests that the prevalence of symptoms of ADHD in children with ASD was 33 to 37% and another paper consider that 30 to 50% of individuals with ASD manifest ADHD symptoms, particularly at preschool age (Berenguer-Forner et al., 2015; Leitner et al., 2014). These disorders present an overlapping of phenotype features because both shows some common signals, as externalizing symptoms, executive dysfunction and appear in the very early development. For this reason, the differential diagnostic it's so difficult (Rommelse et al., 2010).

So, in a neurodevelopmental disorder with a high prevalence of comorbidities associated and poor outcomes are expected important deficits in functionality and lower satisfaction with life. Schmidt and colleagues (2015) evaluated 43 adults (mean age=31) with ASD and without intellectual impairments and 44 controls. They observed that clinical adults reported significant functional impairments and less life satisfaction compared with non-clinical adults. Although, the impairments were higher in areas involving social interaction, such as communication and participation in society, and daily living skills didn't present a difference between the groups.

Another psychological variable that may differ in this group is romantic love, the intensity of this feeling toward another person and how this happens, considering a population with important difficulties around social interaction, communication, sharing emotions and facial perception. The literature is very limited in this subject. There is, however, a study that investigated the nature and predictors of social and romantic functioning in adolescents and adults with ASD. Twenty-five individuals with autism were assessed and they reported less access to peers and friends comparing to the control group, and this fact impacts the learning of social rules and romantic skills. Were concluded that social functioning is related to romantic functioning, and impairments in the first one will cause difficulties in the second. And although these might improve along the years, the velocity is slower compared to individuals without ASD (Stokes et al., 2007).

Cognitive functions of adults with ASD it's another perspective that should be considered, which can also impair in their daily functionality. Baxter et al. (2017) developed a study combining functional and structural neuroimaging and neuropsychological tests to investigate differences between men adults with ASD and neurotypical adults. The ASD group (n=16) committed more mistakes on an executive function task, especially in flexibility, working memory, and inhibition, however there weren't differences comparing to the control group (n=17) in verbal memory and local visual search. They also found that the clinical group presented a reduced brain activity in areas responsible for flexible thinking and the area related to memory seemed to have a smaller volume compared to typical men.

It is well established in the literature that individuals with autism in all ages have more deficits in executive function comparing to neurotypical individuals. And, this dysfunction seems to be relatively stable across development. However, some researchers found smaller effect sizes in adults with ASD. They had higher scores in EF tasks than younger individuals, perhaps due to the use of more compensatory strategies and/or neurodevelopmental maturity (Guastella et al., 2018).

As seen, ASD is a very heterogeneous condition. Our focus in this study is the mildest manifestation of autism, historically called of High Functioning Autism and/or Asperger

Syndrome and nowadays classified as “level 1” (mild) autism in DSM-5. These individuals may have the same classic symptoms of autism, but less severe so they also have fewer impairments in their daily functionality. It's no unusual that they have a good performance at work, develop relationships or live independently. This aspect seems to be related to more quality of life.

As there are just a few studies investigating the symptoms and impairments of ASD in the adult population, especially with high functioning and considering the importance of deepening in this knowledge, our aim in this study is to provide a psychological profile of adults with ASD with high functioning and to understand better their cognitive functions, highlighting the possible deficits and protective factors.

METHODS

Study Design

The study was organized into three phases, as detailed below. The first one we used an online platform for data collection, and we got a total of 1.024 volunteers. They answered questionnaires about mental health and autism traits. Our primary aim was to present a descriptive analysis of the Autism Spectrum Quotient (AQ) in a heterogeneous sample of Brazilian adults with no autism diagnostic, and, we also investigated the scale accuracy (showed in topic 3.1 of this Dissertation).

The AQ scale was developed by Baron-Cohen and colleagues (2001) with the purpose to assess autistic traits in individuals older than 18 years with preserve intelligence. It is a selfreport questionnaire with 50 items that are divided into five different domains: social skill, imagination, communication, attention switching, and attention to details. The score may identify how many symptoms the individual has and the severity of them. This scale can be

used as a support in the diagnostic process, consequently helping with the best intervention choice.

In this second study, our inclusion criteria for participants with probable ASD was volunteers in phase one which showed very high symptomatology of autism, based in the AQ international cutoff (>31 points in the 50 items questionnaire) (Lai & Baron-Cohen, 2015) and/or have a previous diagnosis of autism. Those volunteers compose our clinical group. For the control group, we manually screened the Phase 1 respondents with negative scores for autism in AQ but similar age, sex, sociodemographic status and educational level as our clinical group, in a paired-sample design. Both clinical and control group answered psychometric questionnaires and scales selected to assess several areas of psychosocial functioning: satisfaction with life, cognitive complaints, inattention and hyperactivity symptoms, impulsivity, romantic love and functionality in daily life.

In the third and final phase of this we conducted a personal interview focusing on the clinical diagnosis of autism (according to DSM-5 criteria) and to establish a neurocognitive profile of our participants. Those interviews and assessments were performed in the Center of Technology in Molecular Medicine, a clinical-research facility associated with the Laboratory of Neuroscience and Molecular Medicine of the Federal University of Minas Gerais (UFMG). The clinical volunteers were selected from the second phase considering their residential location (all the adults invited were from Belo Horizonte-MG or cities around) and which showed a general pattern of high function in everyday life, as measured by specific questions designed by our team. Meanwhile, the control group, composed of adults with neurotypical development, again were paired with the volunteers from the clinical group. Figure 2 shows the three phases design, sample size, psychosocial and neurocognitive measures used for assessment.

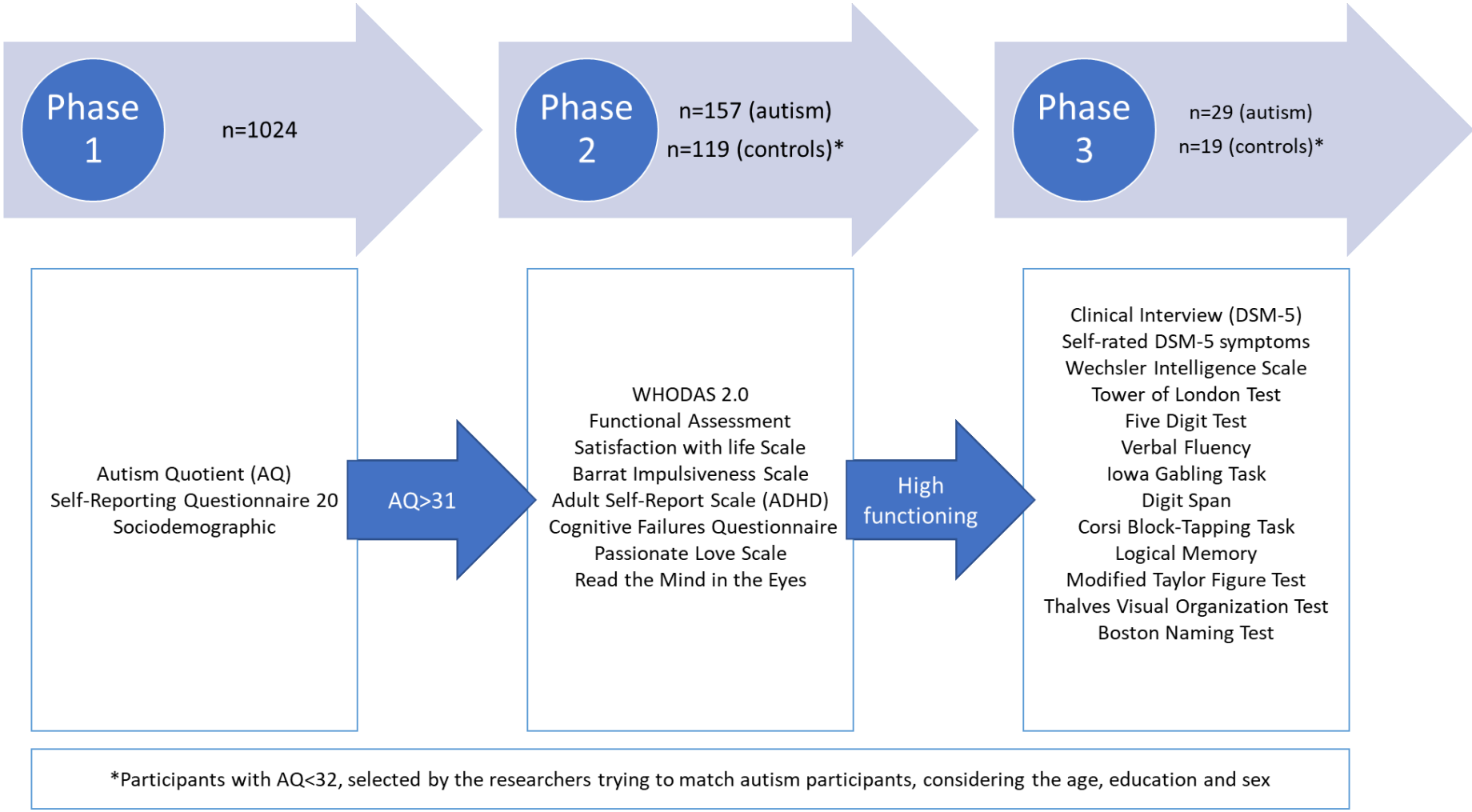


Figure 1: study design and procedures performed in phases 1, 2 and 3

Participants

Firstly, 157 adults (69.4% female), mean age 32 years (SD=7.9), with autism traits evaluated by the Autism Spectrum Quotient, all they got a clinical score (AQ>31) or have previous autism diagnosis. And 119 adults (78.9% female), mean age 32.3 years (SD=9.2), with no self-report of neurodevelopmental disorder and autism traits.

For the presential assessment, 29 adults (68,9% female), their mean was age 34.1 years (SD=8) with autism previous diagnosticated following the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-V) criteria, or with a relevant suspect that we evaluated with an interview during the process (AQ mean=36.1, SD=6.1), their mean years of education was 16.9 years (SD=3.6). And the control group had 19 adults (84,2% female), with mean age 30.9 years (SD=10.6), means year of education was 17.2 years (SD=2.7) and mean score of AQ was 20.2 (SD=4.1).

The exclusion criteria for both groups included age below 18 years and above 60 years old, self-reported history of neurological diseases, intellectual disability or another condition that could impair the assessment process. For the clinical group, exclusion criteria also included the presence of moderate or severe traits of autism that could cause important deficits in daily functionality. And for the control group, clinical score in the AQ scale and the presence or suspect of autism diagnose were considered exclusion criteria.

Psychological assessment

The 276 volunteers, from the second and online phase, answered a series of questionnaires besides the AQ, which is a self-report questionnaire with 50 items that are divided into five different domains: social skill, imagination, communication, attention switching, and attention to details, and that proposes to assess autism traits in adults with preserved intelligence. They also responded to:

1. *The Brazilian Criteria of Economic Classification (Abep, 2016):* a questionnaire designed to assess the social and economic aspects of the population, using a proxy as standardized score based on years of education of the family head, number of members living in the house and quantity of household objects, and access to public services. Higher scores indicate higher socioeconomic status. The standard score can also be divided in social classes, labeled "A" to "D-E", whereas class A indicates higher economic and social level.

2. *World Health Organization Disability Assessment Schedule - WHODAS 2.0:* proposed by the World Health Organization, which has different versions, and we choose the reduced one with 15 items. Its evaluate functionality in six domains, like cognition, mobility, self-care, social interaction, daily and social activities. The higher score indicates less functionality in daily life.

To complement the assessment of functionality has been created eight questions to investigate other aspects of it: *1) How many years in total did you spend studying?; 2) What's your marital status?; 3) How long have you been in this marital status?; 4) Which option best describes your main job activity?; 5) How long have you been in this job?; 6) How many jobs did you have during your life?; 7) Do you contribute with your family income?; 8) Do you live independently in the community or require assistance?*

3. *Satisfaction with Life Scale - SWLS (Diener et al., 1985):* a simple scale with 5 items which evaluates life satisfaction subjectively. This measure is closely related to wellbeing and happiness, and judged in a completely subjective manner (in which differs from quality of life, which have objective indicators). The higher score indicates more satisfaction.

4. *Adult Self-Report Scale - ASRS-18 (Leite, 2011):* 18 items evaluating adult attentiondeficit/hyperactivity disorder (ADHD). The first nine items measure symptoms of inattention, while the other ones represent hyperactivity/impulsivity, where the participant answers the frequency which symptom occur. A higher score in each dimensions more symptoms of ADHD.

5. *Abbreviated version of the Barratt Impulsiveness Scale 11 - ABIS (Coutlee et al., 2014):* a self-report scale which evaluates three different domains of impulsivity: motor, decision making and lack of planning, and a summed score which represents the subject general level of impulsivity. The short version has 13 items, derived from the original 30 questions. Higher scores indicate higher impulsivity,

6. *Passionate Love Scale:* scale with 15 items (abbreviate version) designed to measure the intensity of romantic love toward another person. The number of marked items indicates the intensity of love, so the higher the total score higher will be the intensity of this feeling.

7. *Cognitive Failures Questionnaire (CFQ)*: this scale was designed to assess quantity and frequency of routine mistakes, such as difficulties to focus on some activity, forget names or commitments and/or problems with decision making. There are 25 questions to

evaluate different cognitive aspects, like attention, memory, language, and a higher overall score represents more errors observed by the person in his everyday life.

8. *Reading The Mind in The Eyes Test - RMEt:* test created to assess the capacity of emotional and facial perception toward images of a person's eyes. Every one task of the test (total of 37) has a photograph of a pair of eyes expressing some emotion, and the volunteer has to choose between four options of mental state the one that better match with the facial expression. Therefore, it's possible to evaluate the basics aspects of the theory of mind. Correct answers indicate less difficulty with facial and emotional perception.

For the last phase, consisting in a neuropsychological assessment, the 48 volunteers were interviewed following the DSM-V criteria for Autism Spectrum Disorder and they were required to answer the *DSM-V Self-Rated Level 1 Cross-Cutting Symptom Measure—Adult*, which is a screening instrument for psychiatry symptoms with 23 questions and 13 domains of mental health, such as depression, mania, anxiety, somatic symptoms, and suicide idea. And, there was a battery of neuropsychological tests measuring different cognitive functions, like attention, executive functions, memory, visual ability, and language. Below there are all the abilities assessed and the respective instruments:

1. Intelligence: two subtests of *Wechsler abbreviated scale of intelligence (WASI)*, Vocabulary and Matrix Reasoning.

2. Executive function: Planning - *Tower of London Test*; Cognitive Flexibility - *Five Digit Test (flexibility), Trail Making Test (Part B) and Alternate Verbal Fluency*; Inhibitory Control - *Five Digit Test (inhibition)*, Decision Making - *Iowa Gambling Task*.

3. Processing speed: *Five Digit Test (reading and counting)* and *Trail Making Test (Part A)*.

4. Memory: Verbal and visual working memory - forward and inverse order of *Digit Span and Corsi Test*; Long-term memory - immediate and latter evocation of the *Taylor Complex Figure Test and Logic Memory Test.*

5. Visual Abilities: *Matrix Reasoning (WASI), Visuospatial Ability Test (THALVES)* and the copy of *Taylor Complex Figure Test.*

6. Language: *Vocabulary (WASI), Alternate Verbal Fluency* and *Boston Naming Test (BOSTON).*

The assessment frequently occurred in two sessions and at the end of all the process, the volunteers received a report with the principal findings and suggestion of conduct when it was needed.

Statistical analysis

Firstly, a descriptive analysis was made to characterize both samples and the level of functionality according to the questions formulated.

Considering the non-parametric distribution of the variables, to investigate the relationship between autistic traits and all the psychological variables we choose the Spearman correlation test, with a *p* value of 0.001. And, the same statistic test was used to define the relationship between autistic traits and cognitive functions. Moreover, the clinical and control group were compared in all psychological and cognitive variables using the Mann-Whitney test ($p<0.001$), and then we calculated the effect sizes.

All calculations were performed by SPSS Statistic software, version 25.

RESULTS

Autism group x Control group

There weren't significant differences between groups in social demographic measures, as age, years of education and socioeconomic level. Although, the results suggest a significant difference in all psychological measures ($p<0.001$), with moderate effect size in passionate love (R=-0.33), life satisfaction (R=-0.34), inattention (R=-0.37), cognitive failures (R=-0.39) and functionality (R=-0.50). And a small effect size in impulsivity (R=-0.14), facial/emotional perception (R=-0.15), depression and anxiety symptoms (R=0.27) and hyperactivity (R=-0.28). *(Table 1)*

However, the results seem different when we consider neurocognitive functionality. We didn't find any significant difference between groups in the tests results. These findings suggest that adults with autism from our sample don't have different performance on neurocognitive tests compared to adults with neurotypical development. Despite that, autistics adults present important differences regarding psychosocial measures. (*Table 2*)

Autism traits and psychological/sociodemographic measures

The volunteers (n=276) presented a significant correlation ($p<0.001$) between autistic traits and all psychological variables measured by the questionnaires. Correlations between autistic traits and inattention, hyperactivity, impulsivity, passionate love, functionality, depression, anxiety and cognitive failures were positives, so the more autistic traits the person has probably higher will be the self-report of those variables. However, the self-report of life satisfaction and facial/emotional perception seem to have a negative correlation. So more autistic traits can lead to less satisfaction with life, and a smaller score on the RMET, it means more difficulty with basics aspects of theory of mind.

The results suggest a moderate correlation between autistic traits and age (r=0.3), hyperactivity (r=0.31) life satisfaction (r=-0.33), inattention (r=0.37), depression/anxiety symptoms (r=0.43) cognitive failures (r=0.45) and functionality (r=0.48). And there was a weak correlation between impulsivity (r=0.18), facial/emotional perception (r=-0.21) and passionate love (r=0.27). Also, no correlation between years of education and socioeconomic level. (*Table 3*)

Table 1: Participants description and group comparison on sociodemographic and psychological measures

	Test	Neurotypical (n=119)			Autism (n=157)			Group Comparison*	
		Pc.25	Pc.50	Pc.75	Pc.25	Pc.50	Pc.75	*p*	*r***
Symptoms of Autism	Autism Quotient	16	22	27	34	37	40	-	-
Demographics	Age	21	29	36	32	35	38	0.123	0.09
	Education	15	17	19	15	15	18	0.310	-0.06
	SES	31	38	46	29	37	45	0.156	-0.08
Mental Health	SRQ-20 (Depression/Anxiety)	1	4	9	5	7	12	<0.001	0.27
	CFQ (Cognitive Complaints)	36	46	60	51	64	75	<0.001	-0.39
	RMET (Theory of Mind)	-0.6	-0.1	0.5	-1.2	-0.3	0.5	0.011	-0.15
ADHD Symptoms	ASRS Inattention	12	17	21	17	22	28	<0.001	-0.37
	ASRS Hyperactivity	10	15	21	16	20	24	<0.001	-0.28
	ABIS-11 Impulsivity	23	28	32	25	30	35	0.017	-0.14
Psychosocial	Passionate love (PSL)	68	87	103	88	106	116	<0.001	-0.33
	Disability (WHODAS 2.0)	8%	18%	33%	27%	40%	50%	<0.001	-0.50
	Satisfaction with life (SWLS)	17	23	28	12	17	23	<0.001	-0.34

*Mann-Whitney Test. **Effect size estimated by the $Z/(\sqrt{n})$ equation

SES: Socioeconomic Status, SRQ-20: Self Reporting Questionnaire 20, CFQ: Cognitive Failures Questionnaire, RMTE: Read the Mind in the Eyes Test, ADHD: Attention Deficit Hyperactivity Disorder, ASRS: Adult Self-Reporting Scale 18, ABIS-11: Abbreviated Barratt Impulsiveness Scale 11, PSL: Passionate Love Scale, WHODAS: World Health Organization Disability Assessment Schedule 2.0, SWLS: Satisfaction with Life Scale

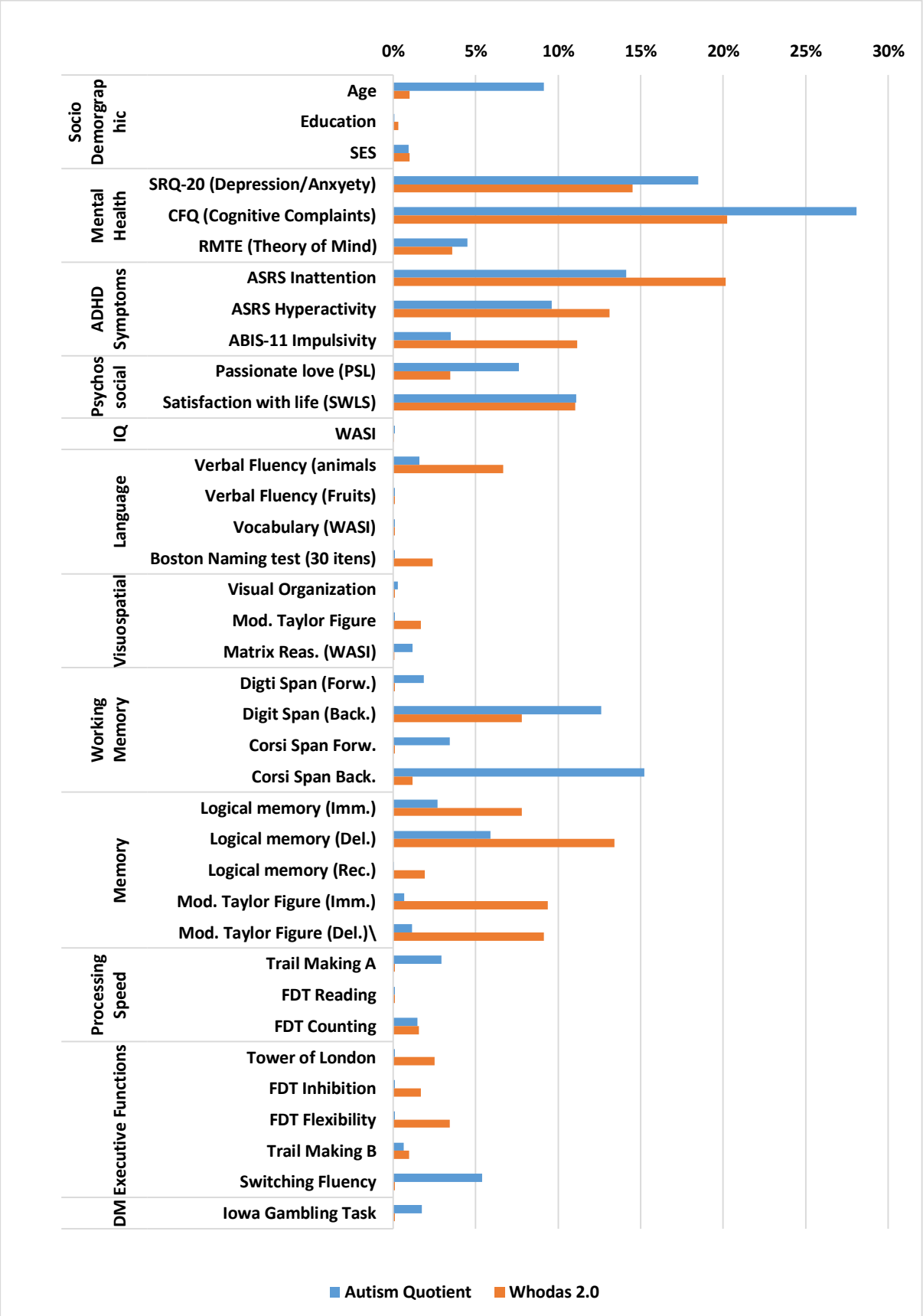
Table 2: Participants description and group comparison on neurocognitive measures

Cognitive domain	**Test**	**Neurotypical (n=19)**			**Autism (n=29)**			**Group Comparison***	
		Pc.25	Pc.50	Pc.75	Pc.25	Pc.50	Pc.75	*p*	*r***
IQ	WASI	82	88	95	84	90	95	0.592	0.08
Language	Verbal Fluency (animals	17	19	22	15	19	22	0.708	-0.05
	Verbal Fluency (Fruits)	14	16	17	14	17	19	0.689	0.06
	Vocabulary (WASI)	44	48	53	45	48	51	0.92	-0.01
	Boston Naming test (30 items)	26	27	29	25	27	28	0.616	-0.07
Visuospatial	Visual Organization	13	14	14	13	14	14	0.765	-0.04
	Modified Taylor Figure	32	34	35	31	32	34	0.090	-0.24
	Matrix Reasoning (WASI)	32	38	43	36	40	46	0.259	0.16
Working Memory	Digit Span (Forward)	8	10	12	8	10	11	0.893	0.00
	Digit Span (Backward)	5	7	9	5	6	7	0.136	-0.21
	Corsi Span (Forward)	35	45	54	40	54	70	0.220	0.18
	Corsi Span (Backward)	35	54	60	48	58	77	0.070	0.26
Memory	Logical memory (Immediate recall)	11	15	18	10	11	16	0.287	-0.15
	Logical memory (Delayed recall)	10	15	16	9	10	16	0.069	-0.26
	Logical memory (Recognition)	13	14	15	12	14	15	0.421	-0.12
	Modified Taylor Figure (Immediate recall)	16	22	25	15	18,5	24	0.177	-0.20
	Modified Taylor Figure (Delayed recall)	18	22	27	16	19	23	0.134	-0.22
Processing Speed	Trail Making A	27	38	42	27	36	53	0.614	0.07
	Five Digit Test Reading	20	24	28	19	23	28	0.575	-0.08
	Five Digit Test Counting	24	27	31	23	26	30	0.246	-0.17
Executive Functions	Tower of London	31	32	34	32	34	35	0.505	-0.10
	Five Digit Test Inhibition	10	14	19	7	14	17	0.561	-0.08
	Five Digit Test Flexibility	19	24	33	17	21	29	0.342	-0.14
	Trail Making B	62	68	89	52	70	81	0.974	0.00
	Switching Fluency Test	8	9	10	7	9	10	0.218	-0.18
Decision Making	Iowa Gambling Task	-4	3	15	-11	16	35	0.456	0.11

* Mann-Whitney Test. ** Effect size estimated by the $Z/(\sqrt{n})$ equation

IQ: Intelligence Quotient, WASI: Abbreviated Wechsler Intelligence Scale

Figure 2: Shared variance between different sociodemographic, psychological and neurocognitive measures with autism traits and disability



Functionality and psychological/sociodemographic measures

We found a significant and moderate correlation between daily functionality and life satisfaction (r=-0.33), impulsivity (r=0.33), hyperactivity (r=0.36), depression/anxiety symptoms (r=0.38), inattention (r=0.44) and cognitive failures (r=0.53). However, a weak correlation between facial/emotional perception (r=-0.18) and passionate love (r=0.18). And, no correlation between functionality and all sociodemographic measures. (*Table 3*)

All correlations were positives, except satisfaction with life, since higher scores on WHODAS indicate worse daily functionality, consequently less life satisfaction. The facial/emotional perception was also negative, so more disabilities are related to more difficulties with Theory of Mind. (*Table 3*)

Autism traits and neurocognitive functions

We observed a significant and moderate correlation between autistic traits and the performance of the inverse order of Corsi test (r=0.39) and inverse order of Digit Span (-0.35), so seems that visuospatial and verbal working memory have a relationship with autistic features. Despite this, no correlation was found (p>0.001) between the autism scale and intelligence, executive functions, language, long-term memory, visuospatial abilities and processing speed. (*Table 4*)

Functionality and neurocognitive functions

Considering the adaptive functionality, we observed significant and moderate correlation only between Logical Memory Test (r=0.36), so higher daily functionality is associated to higher long-term memory. (*Table 4)*

Table 3: Correlations between sociodemographic and psychological measures with symptoms of autism and disability

		Autism Quotient		**WHODAS 2.0**	
		r	*p*	*r*	*p*
Autism x Dyability	Autism Quotient	1	.	0,486	<0.001
	WHODAS 2.0	0,486	<0.001	1	.
Demographics	Age	0,302	0,008	-0.012	0.191
	Education	-0,028	0,856	-0.056	0.284
	SES	-0,097	0,107	-0,07	0,247
Mental Health	SRQ-20 (Depression/Anxyety)	0,430	<0.001	0,381	<0.001
	CFQ (Cognitive Complaints)	0,450	<0.001	0,53	<0.001
	RMET (Theory of Mind)	-0,212	<0.001	-0,189	0,002
ADHD Symptoms	ASRS Inattention	0,376	<0.001	0,449	<0.001
	ASRS Hyperactivity	0,31	<0.001	0,362	<0.001
	ABIS-11 Impulsivity	0,187	0,002	0,334	<0.001
Psychosocial	Passionate love (PSL)	0,276	<0.001	0,186	0,002
	Satisfaction with life (SWLS)	-0,333	<0.001	-0,332	<0.001

*Mann-Whitney Test. **Effect size estimated by the Z/(√n) equation
SES: Socioeconomic Status, SRQ-20: Self Reporting Questionnaire 20, CFQ: Cognitive Failures Questionnaire, RMTE: Read the Mind in the Eyes Test, ADHD: Attention Deficit Hyperactivity Disorder, ASRS: Adult Self-Reporting Scale 18, ABIS-11: Abbreviated Barratt Impulsiveness Scale 11, PSL: Passionate Love Scale, WHODAS: World Health Organization Disability Assessment Schedule 2.0, SWLS: Satisfaction with Life Scale

Table 4: Correlations between neurocognitive measures and symptoms of autism and disability

		Autism Quotient		***WHODAS 2.0***	
		r	*p*	*r*	*p*
IQ	WASI	0,032	0,846	0,008	0,963
Language	Verbal Fluency (Animals)	-0,126	0,459	0,258	0,123
	Verbal Fluency (Fruits)	-0,058	0,737	0,004	0,981
	Vocabulary (WASI)	0,016	0,921	0,045	0,784
	Boston Naming test (30 itens)	0,056	0,726	0,155	0,333
Visuospatial	Visual Organization	-0,054	0,735	0,034	0,833
	Mod. Taylor Figure	-0,006	0,973	0,13	0,417
	Matrix Reas. (WASI)	0,108	0,508	-0,028	0,866
Working Memory	Digti Span (Forw.)	-0,136	0,398	-0,031	0,848
	Digit Span (Back.)	-0,355	0,023	0,279	0,077
	Corsi Span Forw.	0,185	0,246	0,053	0,743
	Corsi Span Back.	0,39	0,013	-0,108	0,509
Memory	Logical memory (Imm.)	-0,164	0,311	0,279	0,082
	Logical memory (Del.)	-0,243	0,13	0,366	0,02
	Logical memory (Rec.)	0,002	0,993	0,138	0,396
	Mod. Taylor Figure (Imm.)	-0,081	0,613	0,306	0,051
	Mod. Taylor Figure (Del .)\	-0,107	0,506	0,302	0,055
Processing Speed	Trail Making A	0,171	0,285	-0,053	0,741
	FDT Reading	-0,06	0,709	0,051	0,753
	FDT Counting	-0,121	0,451	0,125	0,437

Executive Functions	Tower of London	-0,031	0,847	0,158	0,324
	FDT Inhibition	-0,013	0,935	0,13	0,419
	FDT Flexibility	-0,032	0,842	0,185	0,247
	Trail Making B	0,079	0,622	-0,098	0,541
	Switching Fluency	-0,232	0,174	0,056	0,746
Decision Making	Iowa Gambling Task	0,132	0,438	0,057	0,738

DISCUSSION

This study shows us important findings of the relationship between autistic traits and daily functionality with different psychological variables and neurocognitive functions in a sample of adults with autism and high functionality and adults with neurotypical development. Moreover, the differences between clinical and control group in the self-report of these variables and in the performance of cognitive tests.

Initially, we found that autism traits are related to psychiatry symptoms, as depression, anxiety and ADHD, life satisfaction, cognitive failures, functionality, also, but with less power, to impulsivity, passionate love, and facial/emotional perception. These findings are in agreement with studies in the area (Larsson et al., 2014; Dziobek et al., 2015; Roepke et al., 2017). A review published in 2015 by Mousa and colleagues provides studies which show that around 40% of individuals with ASD also have ADHD symptoms, 41% are clinically depressed and 56% are more likely to be diagnosed with some anxiety disorder. They suggest that individuals with autism are more susceptible to internalizing symptoms considering the impairments of social stigma and difficulties with interaction and communication that usually lead to social isolation.

The relationship that we found between autism traits and facial/emotion perception also was already observed in previous studies and it's a frequent difficulty is this population (Wallace et al., 2010; Geurts et al., 2016). However, the weakness of this correlation could be understood if we consider the nature of the test. The RMET evaluate basic aspects of Theory of mind, as our sample have high functionality, we can hypothesize that they didn't present this difficulty or developed strategies to deal with this across life.

In related to the neurocognitive functions, the presence of more autism symptoms in the sample was only correlated to higher scores on visuospatial working memory and lower scores on verbal working memory. Koshino and colleagues (2005) observed in their sample of adults with high-functioning autism that the control group might use verbal codes to perform the memory task, while adults with autism use visual codes. Also, in another study, Geurts and

colleagues (2016) evaluated 236 adults with and without ASD and they concluded that the clinical group presents higher scores on visual memory, but similar scores on verbal memory.

Considering functionality aspects, we found that different aspects of daily functionality are related to many psychosocial variables, as satisfaction, psychiatry symptoms and cognitive failures. Individuals from our study with preserved mobility and cognitive capacity, with no difficulties with self-care and daily activities, expressed more wellbeing and satisfaction with their lives. Nevertheless, the presence and intensity of psychiatry symptoms in our sample seem to impair functionality. It's expected that individuals with depression or anxiety disorders have lower daily functionality.

Some researches pointed to cognitive preserve in childhood, also average or higher intelligence, as an important predictor of functionally in adulthood, and the adequate development of language is related to better outcomes in life (Rutter et al., 2014). It is well established in the literature that executive functions are strongly related to the ability to adapt to daily activities (de Paula et al., 2015), to problems resolve (Paiva et al., 2015) and to affective regulation (Malloy-Diniz et al., 2009) in the general population.

However, some recent studies provide different findings for the autism population. Some researches lead to the importance of the presence and severity of autism traits impacting daily functional adaptation. In a study conducted by Tillmann and colleagues (2019), 417 individuals with ASD with different ages were evaluated and their results demonstrated high impairments in functionality. They found that social communication problems, a core symptom of autism, contributed to this lower adaptive functionality. While sensory, repetitive symptoms or co-occurring psychiatric symptoms didn't have an important contribution. Another study found similar results. They highlighted the impact of socialization and daily living skills on adaptive functioning, especially in higher functioning individuals. They suggested that cognitive function does not fully explain the functionality impairments in the autism population (Bolognani et al., 2018).

The literature also suggests the same pattern in the autism child population. Baird and colleagues (2011), observed in 75 children with ASD that autism traits were less associated with IQ, and they found impairments on adaptive outcome even on those children with average intelligence. In another study, children with ASD presents adaptive function scores below IQ, pointing to the presence of impairments in functionality despite cognitive abilities (Lord et al., 2007). So, the impact of autism traits in daily functionality and the lower profile of adaptive functioning in our sample were also observed in previous studies. And we also found that

cognitive abilities are not really related to functionality, considering that only long-term verbal memory correlated to the functionality scale.

The comparisons established between the clinical and control group provided some results that we expected and are in agreement with the literature. We found significant differences in all psychological variables. As we already described, it's more frequent in the autism population the presence of comorbidities psychiatric, as ADHD symptoms (BerenguerForner et al., 2015; Leitner et al., 2014) and others mental problems, such as depression and anxiety (Rutter et al., 2015; Croen et al., 2015). And if we consider the core symptom of ASD as deficits on social interaction and communication, impairing the way interpersonal relationships are constructed, it's also expected a difference in this population regarding facial/emotional perception and also romantic love, feeling toward another person (Stokes et al., 2007). Whereas all the scenario of symptoms and impairments on functionality, individuals with autism also present less satisfaction with life comparing to neurotypical adults. (Schmidt et al., 2015).

Considering cognitive abilities, we didn't find differences between groups in the neuropsychological tests results. Adults with autism and high functionality from our sample present a preserved cognitive profile, they don't have significantly more or less cognitive deficits comparing to adults with neurotypical development. There are many studies evaluating neurocognition of autistic children and the literature are in agreement that this population have more deficits in executive function, especially planning, inhibitory control, and cognitive flexibility, also deficits in attention than the neurotypical population. (Taddei & Contena, 2015; Hill, 2004; Kaland, Smith, & Mortensen, 2008). However, the neuropsychological profile of adults with mild traits of autism is not really clear, considering that we don't have a large range of studies in this are yet.

A study conducted by Murphy and colleagues (2015) found different results from ours, they evaluated 89 males adults with ASD and 89 matched neurotypical control. They found significant differences between groups in half of the neuropsychological tests. The clinical group had more deficits on attention, inhibition and emotion recognition. However, they didn't find correlations between autism symptoms and cognitive factors, and the clinical group also have more psychological comorbidities than the control group. Those results are similar to ours, supporting the idea that symptoms severity doesn't predict their cognitive skills.

To finish, the present study has some limitations. In all assessment process, we didn't have access to the family report, that could give us more details about the patient functionality and symptoms, also, about the clinical history. Considering that ASD is a neurodevelopmental

disorder, knowing with details about the individual's infancy could have helped us in the diagnostic process. Another possible limitation was the fact that part of the assessment was online. Although studies (Hoerguer et al., 2011) provided a good equivalence between tests and scales used in the virtual and presential environment, answer to questionnaires online can submit us to possible misinterpretations. Another aspect that could impact our findings was that we didn't consider the presence of mental disorder as an exclusion criterion for the control group, only autism or another neurodevelopmental disorder.

CONCLUSION

ASD is a neurodevelopmental disorder consisted of the presence of problems with social interaction, inflexible, repetitive or stereotyped behaviors and thoughts. Nowadays, it is seen in a dimensional view. Our study focused on adults with the mild manifestation of the disorder and those with high functionality. We found that the intensity of these traits is significantly related to mental health, daily adaptive, satisfaction with life, also influence social interaction. Functionality can also interfere in these psychosocial variables. On the other hand, autism traits and functionality weren't related to neurocognitive function, only with working and long-term memory.

Another important finding is that autism traits influence on deficits in daily functionality more than cognitive abilities. We also found substantial differences between the groups in all psychosocial variables, but not between neurocognitive functions, evidencing that the autistics from our sample presents important impairments only in psychological and social aspects.

Studies with the adult population are necessary because the knowledge of the autism symptoms and the principal impairments, also how this affect their lives, is essential to guide the choice of adequate interventions. Since our findings suggest, this intervention should be focused especially on improving social skills and giving support on basic aspects of daily adaptive. Also, knowing the major deficits of this group could prepare adolescences for the adulthood life, planning more effective services and giving proper support. To conclude, studies in this area are still very necessary and it's the only way to provide adequate intervention, considering individual difficulties. In this way, turn possible for them to have more positives outcome and a higher quality of life.

CONFLICTS OF INTEREST

The authors declare no conflict of interest

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5. CONSIDERAÇÕES FINAIS

Através dos dois artigos apresentados nessa dissertação, realizamos uma análise descritiva da escala Quociente do Espectro do Autismo (QA) em uma amostra heterogênea de adultos brasileiros e investigamos a sua precisão no diagnóstico de adultos com TEA e inteligência preservada. Foi possível concluir que a nossa amostra apresenta um perfil diferente da amostra do estudo original, mas que apesar disso, a escala apresentou-se eficaz no processo de diagnóstico.

No segundo estudo, caracterizamos o perfil psicossocial, funcional e neurocognitivo de indivíduos adultos com TEA e alta funcionalidade. Analisamos as possíveis relações existente entre essas variáveis e comparamos adultos com autismo com uma amostra de adultos com desenvolvimento típico. Observamos que a presença e a intensidade de traços autísticos se relacionam com satisfação com a vida, ansiedade, depressão, sintomas de TDAH, amor romântico, queixas cognitivas e percepção facial/emocional, além de funcionalidade diária. Esta, por sua vez, também se relaciona com todas as variáveis psicossociais mencionadas.

Em relação as habilidades neurocognitivas, sintomas de autismo e funcionalidade apenas se relacionam com memória de trabalho e de longo prazo. Além disso, encontramos diferenças significativas entre os grupos em todas as variáveis psicossociais avaliadas, porém, não houve diferenças em relação ao perfil neurocognitivo.

O presente estudo apresenta algumas limitações a serem consideradas, como a ausência de participação de familiares no estudo, principalmente pais ou cuidadores, o que possibilitaria ter acesso a mais informações acerca dos sintomas e funcionamento do paciente, bem como sobre o seu histórico. Parte do estudo foi realizado online, o que poderia nos deixar suscetíveis a erros de compreensão, embora, haja estudos comprovando que existe equivalência entre estudos realizados virtual e presencialmente. Por fim, outra possível limitação diz respeito aos critérios de exclusão do grupo controle, visto que a presença de sintomas psiquiátricos, como depressão e ansiedade, não foi considerada um critério de exclusão.

Nossos resultados apontam para o impacto dos traços de autismo na adaptação funcional dos indivíduos, e observamos que as habilidades cognitivas não são capazes de explicar os prejuízos funcionais que a população de autismo apresenta. Apesar disso, enfatizamos a importância de estudos como esse visto que possibilitam o desenvolvimento e a escolha de intervenções que sejam cada vez mais adequadas e que possam atender efetivamente as demandas das pessoas com autismo. E dessa forma, melhor a qualidade de vida, a satisfação e o bem-estar dessas pessoas.

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7. ANEXOS

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO – Plataforma Virtual

Título da Pesquisa: IDENTIFICAÇÃO DE PREDITORES DE ADAPTAÇÃO FUNCIONAL EM ADULTOS COM SÍNDROME DE ASPERGER E OUTROS TRANSTORNOS DO ESPECTRO AUTISTA. FASE 2.

Nome dos Pesquisadores Principais: Prof. Jonas Jardim de Paula, Prof. Marco Aurélio Romano-Silva

Você sendo convidada (o) a participar desta pesquisa que tem como finalidade identificar quais características, psicológicas, comportamentais, emocionais e sociais se relacionam com uma boa capacidade de adaptação ao dia a dia. Nosso foco é a identificação desses preditores em pessoas com Síndrome de Asperger ou Transtorno do Espectro Autista. Nossa pesquisa é dividida em cinco fases. Nessa segunda fase convidamos adultos, independente de terem esses diagnósticos ou não, a responderem uma breve entrevista e alguns questionários e escalas em ambiente virtual, utilizando uma plataforma disponível na internet.

O foco dessa pesquisa é avaliar adultos com esses dois transtornos e adultos típicos, sem os transtornos, mas sua prevalência é muito baixa (menos de 1% das pessoas). Seria inviável atingir o número de participantes de nossa pesquisa, aproximadamente 110 participantes, pelos meios de recrutamento tradicionais. Nesse sentido desenvolvemos uma plataforma virtual para a avaliação de uma série de aspectos psicológicos e comportamentais, inclusive aqueles mais característicos à Síndrome de Asperger e ao Autismo.

Ao participar dessa fase da pesquisa você será convidado a responder uma série de questionários, escalas e testes sobre as principais características desses dois quadros. Você tem plena tem liberdade de se recusar a participar e ainda se recusar a continuar participando em qualquer fase da pesquisa, sem qualquer prejuízo. Sempre que quiser poderá pedir mais informações sobre a pesquisa através de nossos telefones e e-mails, ou ainda, se necessário, através do telefone do Comitê de Ética em Pesquisa.

A participação nesta pesquisa não traz complicações legais. Não prevemos maiores riscos em sua participação, a não ser um possível descoforto durante as entrevistas ou avaliações. Caso ocorram, você tem total liberdade para solicitar a interrupção das mesmas, sem qualquer ônus adicional. Os procedimentos adotados nesta pesquisa obedecem aos Critérios da Ética em Pesquisa com Seres Humanos conforme Resolução no. 196/96 do

Conselho Nacional de Saúde. Nenhum dos procedimentos usados oferece riscos à sua dignidade. Todas as informações coletadas neste estudo são estritamente confidenciais. Somente os pesquisadores envolvidos terão conhecimento dos dados.

Ao participar desta pesquisa você não terá nenhum benefício direto. Entretanto, esperamos que este estudo traga informações importantes sobre pacientes com Síndrome de Aspeger ou Autismo. Nós nos comprometemos a divulgar os resultados obtidos nos principais meos de comunicação científica. Você não terá nenhum tipo de despesa para participar desta pesquisa, bem como nada será pago por sua participação. Contudo, receberá um breve relatório com o resultado de alguns testes e escalas.

Após estes esclarecimentos, solicitamos o seu consentimento de forma livre para participar desta pesquisa. Portanto marque, por favor, os itens que se seguem.

Obs: Não assine esse termo se ainda tiver dúvida a respeito. Entre em contato com os pesquisadores nos e-mails abaixo para qualquer esclarecimento.

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