

# Psychologists training on autism: a cross-sectional study with undergraduate students

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**Abstract:** Objectives: describing the level of knowledge about Autism Spectrum Disorder (ASD) among Psychology students, comparing the same knowledge among freshmen students and seniors; verifying if students that have gone through undergraduate research (UR) activities had greater knowledge about this. 295 students from two São Paulo's private universities that answered a self-administered structured survey form containing 16 questions about epidemiology, symptomatology, interventions and services for ASD. This study showed an insufficient level about this kind of knowledge – TEA (< 50%), but revealed progress during its course, in a general inquiry among the investigated areas. Students who did UR on mental health performed better than others. Conclusions: the students revealed signs of improvement in their knowledge during the course, but insufficiently, pointing a need for review/reformulation in the Psychology curricula. It is still necessary that further work to assess the quality of formation of these future professionals.

**Keyword:** Autism Spectrum Disorder; undergraduate students; training; health psychology; childhood development.

## FORMAÇÃO DO PSICÓLOGO SOBRE AUTISMO: ESTUDO TRANSVERSAL COM ESTUDANTES DE GRADUAÇÃO

**Resumo:** Objetivos: descrever o nível de conhecimento sobre Transtorno do Espectro Autista-TEA entre estudantes de Psicologia; comparar o nível de conhecimento entre alunos do primeiro e último ano; verificar se alunos que haviam realizado atividades de iniciação científica (IC) possuíam maior conhecimento sobre TEA. Participaram do estudo 295 alunos de duas universidades particulares da cidade de São Paulo que responderam de forma autoaplicável a um questionário estruturado com 16 perguntas sobre epidemiologia, sintomatologia, intervenções e serviços para TEA. O estudo indicou nível insatisfatório no conhecimento sobre TEA (<50%), mas revelou progresso no decorrer do curso, tanto no cômputo geral quanto nas áreas investigadas. Estudantes que realizaram IC em saúde mental apresentaram melhor desempenho. Conclusões: estudantes apresentaram evolução em seus conhecimentos no decorrer do curso, mas de forma insuficiente, indicando necessidade de revisão/reformulação dos currículos de

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Psicologia. Ainda é necessário que futuros trabalhos avaliem a qualidade de formação desses futuros profissionais.

**Palavras-chave:** Transtorno do Espectro Autista; estudantes universitários; capacitação; psicologia da saúde; desenvolvimento infantil.

## FORMACIÓN DEL PSICÓLOGO EN AUTISMO: ESTUDIO TRANSVERSAL CON ESTUDIANTES DE LICENCIATURA

**Resumen:** Objetivos: describir el nivel de conocimientos sobre Trastorno del Espectro del Autismo (TEA) entre estudiantes de Psicología; comparar el nivel de conocimientos entre alumnos del primer y último año; verificar si los alumnos que realizaron actividades de (IC) tenían mayor conocimiento sobre TEA. 295 alumnos de graduación de dos universidades privadas de la ciudad São Paulo respondieron a un cuestionario estructurado con 16 preguntas sobre epidemiología, sintomatología, intervenciones y servicios para TEA. El estudio indicó nivel insatisfactorio de conocimiento sobre TEA (< 50%), pero reveló progreso en el transcurso del curso, tanto para los cálculos generales como en las cuatro áreas investigadas. Estudiantes que realizaron IC en salud mental mostraron mejor desempeño. Conclusiones: estudiantes presentaron evolución en sus conocimientos a lo largo del curso, pero de forma insuficiente, indicando necesidad de revisión/reformulación de los currículos de Psicología. Continua siendo necesario que futuros trabajos evalúen la calidad de formación de esos futuros profesionales.

**Palabras clave:** Trastorno del Espectro del Autismo; estudiantes universitarios; capacitación; psicología de la salud; desarrollo infantil.

## Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder with early onset and chronic progression. It is characterized by a deviation in one's social development with the presence of restrictive and stereotyped behaviors/thoughts (American Psychiatric Association, 2013).

Even though ASD is already well-established based on studies published since the 1940s, its signs and symptoms vary, as do the disorder's levels of severity. Additionally, there is no biological marker for ASD, meaning it is identified through proper clinical assessment, preferably performed by a multidisciplinary team, which establishes the individual's clinical profile along with potentialities and main deficits (Brentani et al., 2013). The psychologist, together with the physician (preferably a psychiatrist, a pediatrician or a neurologist), is one of the most important professionals within the multidisciplinary team because s/he is responsible for establishing the diagnosis (Bordini et al., 2014).

For this reason, qualified training in typical and atypical development is essential for a psychologist's good practice. In this sense, psychology students are expected to be prepared and be able to listen to parents' complaints concerning ASD and recognize characteristic signs and symptoms, as well as noticing the differentials of this disorder. Therefore, several authors defend the inclusion of subjects and content in the curricula of undergraduate psychology programs and of other professions in the health field to contribute to the identification of ASD and also to assist children, youth, and adults with ASD (Paula, Belisário Filho, & Teixeira, 2016; Paula, Lauridsen-

Ribeiro, Wissow, Bordin, & Evans-Lacko, 2012). Note that undergraduate programs in Psychology currently available in Brazil are based on a generalist and interdisciplinary model, in accordance with the national curricular guidelines established in 2004 (and updated in 2011), which are supposed to include the possibility of students choosing areas they want to emphasize via supervised training or by taking courses that meet different social demands (Ministério da Educação, 2011). At the same time, studies show that psychologists play an important role in the Brazilian context, as Brazil is one of the countries with the highest number of psychologists, both in comparison to the world average and to other countries in South America, such as Uruguay. Even though most (approximately 70%) of these professionals work outside the Brazilian Public Health System (SUS), there are psychologists available in several Psychosocial Care Centers (CAPS) around Brazil, and in approximately 14% of the Primary Health Care Units in the state of São Paulo (Paula et al., 2012).

Considering that psychologists are highly relevant in the identification and treatment of people with mental health problems, including ASD, identifying the type and quality of education psychologists receive is key, especially due to a lack of data concerning this context in Brazil. A survey conducted in one of the most important Brazilian scientific periodicals addressing the education of psychologists reveals that only two studies have focused on the subject concerning education directed to ASD: one theoretical paper published 14 years ago (Souza et al., 2004) and a recent study investigating the empirical data of a sample of undergraduates from psychology programs provided by public and private universities located in Sao Paulo (Paula et al., 2016). The study published in 2016 reports that 85 senior students from the Psychology programs of both public and private colleges presented good general knowledge concerning the identification and assistance provided to individuals with ASD, particularly knowledge concerning devices within the SUS, therapeutic approaches, and medications. In contrast, their level of specific knowledge that is compatible to specialized education provided in Psychology, which includes information regarding the clinical condition of ASD, etiology and epidemiological data, was considered to be regular or poor. These results are a warning about the preparation of these students who will soon be in the job market, but they do not help one to understand how knowledge of ASD is gained during the educational process of a Psychology program.

Continuing the aforementioned study, this study's objectives include verifying and comparing the level of clinical and epidemiological knowledge concerning ASD between 1<sup>st</sup> and 5<sup>th</sup>-year undergraduate Psychology students. A secondary objective is verifying whether additional training provided through projects of scientific research initiation in the field of mental health is associated with the students' level of knowledge concerning ASD.

## Method

This sectional study included a sample of 295 undergraduate students from the undergraduate psychology programs of two private universities located in the city of

Sao Paulo, SP, Brazil: one of which has 130,000 students and the other has 40,000 students, 3,400 (2.6%) and 1,400 (3.5%) of whom were enrolled in psychology programs, respectively.

Inclusion criteria were: (i) being regularly enrolled in the 1<sup>st</sup> or 5<sup>th</sup> year of the undergraduate Psychology programs of two universities located in the city of Sao Paulo and (ii) being older than 18 years of age. The students were 23 years old on average ( $SD = 7.1$ ); 252 were women (85.4%), and 189 (64.1%) were attending the 1<sup>st</sup> year of the program.

## Instruments

A questionnaire was developed to address epidemiological, clinical, and intervention aspects and the use of mental health services in Brazil. This questionnaire was based on the study by Paula et al. (2016) and was improved considering the limitations reported.

The updated questionnaire has multiple-choice questions classified into four categories: (i) four questions address epidemiology including its general prevalence in the population and frequency according to sex; (ii) four questions address the disorder's clinical characteristics, such as diagnostic criteria and signs/symptoms; (iii) four questions address evidence-based drug therapies and psychotherapies; (iv) two questions address mental health services and the composition of the health staff in Brazilian services. In addition to these 14 questions, the questionnaire presents two vignettes. The first describes the case of a four-year-old boy whose parents had reported atypical development to their pediatrician since early childhood but the diagnosis was postponed; a diagnosis of ASD was established at the age of three. The second vignette describes a five-year-old girl who was born prematurely, but whose parents had not identified delayed development until she was enrolled in school. A question was posed at the end of each vignette about what would be the most appropriate intervention for each case. Thus, the questionnaire totaled 16 multiple-choice questions and an additional question asking whether the student had taken part in a Scientific Research initiation program. Both questionnaire versions were individually self-applied.

## Data collection and analysis procedures

The study's participants were invited in their classrooms or through social networks (e.g., Facebook, Twitter). Data were collected on the institutions' premises according to the participants' availability. All the participants signed free and informed consent forms, and the project was approved by the Institutional Review Board at the Mackenzie Presbyterian University (Protocol No. P025/11/12).

## Statistical analysis

Data were compiled and analyzed using SPSS, version 19.0. Descriptive statistical analyses were performed to identify means and standard deviations of the number of

correct answers. Bivariate inferential statistical analyses tested differences in the levels of knowledge of students according to the period they were attending, controlling for extracurricular academic activities linked to scientific research. Mean difference tests (Student's t-test) were performed for the continuous variables with normal distribution, and the non-parametric Chi-square test was performed for the categorical variables. Significance was calculated using Pearson's test or Fisher's Exact test, when applicable. A significance level of 5% was adopted to reject the null hypotheses.

## Results

A moderate number of correct answers was found when the scores obtained by the 1<sup>st</sup> and 5th-year undergraduate Psychology students were grouped together; none of the 16 questions achieved a percentage of correct answers above 50%, and half the questions achieved a percentage below 30%. The questions that the students most frequently answered correctly were those related to the early signs of ASD (46.1%) and evidence-based therapeutic approaches (42.2%). On the other hand, a low level of correct answers was identified in items related to Epidemiology (only 10.2% in the distribution according to sex and 5.4% for rate of prevalence), the most appropriate interventions for the cases presented in the vignettes (9.9%), and those regarding screening scales available in Brazil (2.2%). Additionally, a gap was found between the correct answers provided to a theoretical question addressing therapeutic approaches (42.2%) and the question addressing the application of these approaches into practice. That is when the students had to propose the most appropriate therapies for the cases presented in the vignettes, 28.6% and 9.9% were correct answers.

As expected, the 5th-year students had the best performance, a total mean of 6.5 ( $SD = 2.4$ ) compared to the 3.4 ( $SD=2.1$ ) achieved by the 1st-year students, which is a statistically significant difference ( $p < 0.01$ ; CI95%: 2.6 – 3.6).

Table 2 shows that, in general, the 5th-year students performed better than the 1st-year students considering each of the questionnaire's questions. A statistically significant difference was found in 14 of the 16 questions. The two questions in which significant differences were not found referred to failures in the development of children with ASD and the etiology of ASD. The most expressive differences were found in the questions concerning the most recommended therapies for ASD, in which the 5th-year students were nine and 20 times more likely to answer correctly compared to the 1st-year students. Another answer that deserves to be highlighted was related to the most appropriate facility/unit within the public health system to care for individuals with ASD; 5th-year students answered correctly seven times more than the 1st-year students ( $p < 0.01$ ; OR = 7.28; CI95%: 4.22-12.56).

**Table 1. Distribution of correct answers according to each of the questions addressing knowledge regarding ASD in the total sample (N = 295).**

Questionnaire items	Total number of correct answers	
	N	(%)
Signs that suggest ASD among 18 to 24-month children	136	46.1
Therapeutic approach with greater evidence of efficacy*	124	42.2
Symptoms minimized with medication*	109	37.1
Failure in the development of children with ASD**	102	34.8
Etiology of ASD**	102	34.8
Diagnosis criteria	96	32.5
Primary facility in the public health system***	96	33.0
Composition of multidisciplinary team	90	30.5
Characteristics that suggest autism***	86	29.6
Vignette – Joaquim (most appropriate intervention)*	84	28.6
Savant Skill***	83	28.5
Occurrence of ASD among siblings	77	26.1
Distribution according to sex**	30	10.2
Vignette – Maria Luísa (most appropriate intervention)*	29	9.9
ASD prevalence	16	5.4
Screening scales	6	2.0

\* Dropout of one case; \*\* dropout of two cases; \*\*\* dropout of four cases.

**Table 2. Level of knowledge on the ASD questionnaire according to the school year and univariate analysis: odds ratio with a confidence interval of 95% [OR (CI 95%)] and p-values for the Chi-square test (N = 295).**

Questionnaire's items		School Year		OR*	p
		1°	5°		
		N (%)	N (%)		
Failures in the development of children with ASD	Correct	65 (34.6)	37 (35.2)	1.03 (0.62-1.70)	0.91
	Wrong	123 (65.4)	68 (64.8)		
Signs of ASD in 18- to 24-month-old children	Correct	79 (41.8)	57 (53.8)	1.62 (1.00-2.61)	0.04
	Wrong	110 (58.2)	49 (46.2)		
Therapeutic approach with the highest evidence of efficacy	Correct	45 (23.9)	79 (74.5)	9.29 (5.36-16.12)	0.04
	Wrong	143 (76.1)	27 (25.5)		

(continues)

**Table 2. Level of knowledge on the ASD questionnaire according to the school year and univariate analysis: odds ratio with a confidence interval of 95% [OR (CI 95%)] and p-values for the Chi-square test (N = 295).** (conclusion)

Questionnaire's items		School Year		OR*	p
		1°	5°		
		N (%)	N (%)	(CI 95%)**	
Symptoms minimized with medication	Correct	60 (31.9)	49 (46.2)	1.83 (1.12-2.99)	0.01
	Wrong	128 (68.1)	57 (53.8)		
ASD Etiology	Correct	65 (34.6)	37 (35.2)	1.03 (0.62-1.70)	0.90
	Wrong	123 (65.4)	68 (64.8)		
Diagnostic criteria	Correct	44 (23.3)	52 (49.1)	3.17 (1.90-5.27)	<0.01
	Wrong	145 (76.7)	54 (50.9)		
Primary facility in the Public health system	Correct	32 (17.3)	64 (60.4)	7.28 (4.22-12.56)	<0.01
	Wrong	153 (82.7)	42 (39.6)		
Characteristics that suggest autism	Correct	43 (23.1)	43 (41.0)	2.30 (1.37-3.87)	<0.01
	Wrong	143 (76.9)	62 (59.0)		
Composition of a multidisciplinary team	Correct	49 (25.9)	41 (38.7)	1.80 (1.08-2.99)	0.02
	Wrong	140 (74.1)	65 (61.3)		
Savant Skill	Correct	38 (20.5)	45 (42.5)	2.85 (1.68-4.82)	<0.01
	Wrong	149 (79.5)	61 (57.5)		
Vignette – Joaquim (most appropriate intervention)	Correct	32 (17.0)	52 (49.1)	4.69 (2.74-8.04)	<0.01
	Wrong	156 (83.0)	54 (50.9)		
Occurrence of ASD among siblings	Correct	37 (19.6)	40 (37.7)	2.49 (1.46-4.24)	<0.01
	Wrong	152 (80.4)	66 (62.3)		
Distribution according to sex	Correct	10 (5.3)	20 (19.0)	4.18 (1.87-9.34)	<0.01
	Wrong	178 (94.7)	85 (81.0)		
Vignette – Maria Luísa (most appropriate intervention)	Correct	3 (1.6)	26 (24.5)	20.04 (5.89-68.12)	<0.01
	Wrong	185 (98.4)	80 (75.5)		
ASD prevalence	Correct	4 (2.1)	12 (11.3)	5.87 (1.84-18.70)	<0.01
	Wrong	184 (97.9)	94 (88.7)		
Screening scales	Correct	0 (0.0)	6 (5.7)	2.89 (2.46-3.38)	<0.01
	Wrong	189 (100)	100 (94.3)		

\* OR: Odds Ratio; \*\* CI 95%: Confidence Interval of 95%.

When the performance of the undergraduate Psychology students was assessed according to the questionnaire's four domains, we found that the best performance was obtained in the two questions concerning the public health services directed to people with ASD: CAPS, as the most specialized unit within the public health system, and the one concerning the composition of multidisciplinary teams. On the other hand, the worst result was verified to be the topic Epidemiology (rate of prevalence, distribution according to sex, and occurrence of ASD among siblings and proportion of savants among people with ASD), with a mean of 2.88 points ( $SD = 0.91$ ) among 1st-year students and 3.53 ( $SD = 0.72$ ) among 5th-year students. The senior students presented the best performance in the four domains of the questionnaire (Table 3).

**Table 3. Comparison of the mean of wrong answers between 1st and 5th-year students according to the domains of the questionnaire addressing knowledge of ASD (N = 295).**

Domains	Mean of errors (SD)* per school year		p	CI 95%**
	1°	5°		
Epidemiology	3,53 (0,72)	2,88 (0,91)	<0,01	-0,84; -0,46
Health services	1,57 (0,59)	1,01 (0,74)	<0,01	-0,72; -0,41
Evidence-based therapeutic approach	3,25 (0,83)	2,06 (1,08)	<0,01	-1,41; -0,97
Symptomatology	1,84 (0,97)	2,57 (1,11)	<0,01	-0,98; -0,47

\* SD: Standard deviation; \*\* CI 95%: Confidence Interval of 95%

Only 11 of the participants (3.4%) had been initiated in scientific research and only one specifically in research regarding ASD. The mean of answers correctly answered by the students who had initiated scientific research in the field of mental health (N = 7, 2.4%) was compared to the mean of those who had not participated in any research project in this field (N = 288; 97.6%). Data indicate that the first group scored higher than its counterparts (7.5 x 4.4), with statistically significant differences ( $t = -3.7$ ;  $p = 0.008$ ; CI95%: -5.0 – 1.1).

## Discussion

This research shows that none of the 295 Psychology students correctly answered more than 50% of the questions addressing ASD knowledge covering topics that are fundamental to good clinical practice, such as epidemiological and clinical data, evidence-based intervention models, and mental health services available within the SUS.

A low number of correct answers was identified in terms of therapeutic approaches most frequently recommended for the ASD cases presented in the two vignettes,



suggesting that education provided in Psychology programs need to be improved in light of the health needs of current society. Interestingly, a higher number of correct answers was found when this question was theoretical in nature; that is, 42.2% of the participants were able to tell that the behavioral approach is the therapy that presents the best evidence of efficacy in the treatment of ASD (Brentani et al., 2013; Reichow, 2012). These results show that the most general content on how to treat patients with ASD has been provided in Psychology programs; however, these programs need to provide an interface between theory and practice. Evidence-based practices are based on different models of ASD interventions, particularly behavioral approaches mainly implemented in the first years of life, such as Early Intensive Behavior Intervention (EIBI) (Reichow, 2012). The models that follow the Treatment and Education of Autistic and related Communication-Handicapped Children (ASDCCH method), as well as drug treatment for some secondary symptoms such as agitation (Brentani et al., 2013) and more recently the Early Start Denver Model (Vivanti et al., 2014) are some examples.

ASD does not present a single biological marker. For this reason, the diagnosis is established clinically and should be based on international classification manuals, such as the DSM and the ICD (Paula et al., 2012). There are various screening instruments used to diagnose children and that have been translated and adapted for the Brazilian context: the Autism Behavior Checklist (ABC); the Autistic Traits Assessment Scale (ATA); Autism Screening Questionnaire (ASQ); Childhood Autism Rating Scale (CARS); the Modified Checklist for Autism in Toddlers (M-CHAT) (Backes et al., 2014); the *Observação Estruturada para Rastreamento de Autismo* – OERA [The Structured Observation for Autism Screening] (Paula et al., 2017) and the Autism Mental Status Examination – AMSE (Galdino et al., 2018). At the same time, there are diagnostic instruments considered to be the “gold standard,” mainly the Autism Diagnostic Interview-Revised (ADI-R) (Lord, Rutter, & Le Couteur, 1994) and the Autism Diagnostic Observation Schedule-Generic (ADOS) (Lord, Rutter, DiLavore, & Risi, 1999). The ADI-R has been already validated for Brazil and, even though there is a Brazilian version of the ADOS, it is undergoing a validation process (Marques & Bosa, 2015). Note that even after validation, the use of the ADOS and ADI-R is recommended in specific situations because the material has to be bought directly from the American publishing company and they are also high-cost and require long-duration specialized training, restricting their use on a large scale.

Another piece of information that deserves to be highlighted refers the students’ lack of knowledge concerning screening scales available in Brazil; 97.8% of the participants were unable to report this information. Both within private clinics and within the SUS, psychologists have one of the essential responsibilities, which is to detect ASD signs/symptoms as early as possible and, for this reason, they need to be aware of validated tools that can aid this process. Results indicate that both Psychology students and psychologists who have attained a degree lack the knowledge and/or the habit of using more systematized measures in their practices. A previous study

assessing practice with psychological tests in a sample of 214 psychologists reveals that a significant portion of these professionals, 29.9% (N = 64), do not systematically use these assessment instruments (Noronha, 2002). At the same time, it is important to keep in mind that there are various studies on screening instruments adapted to Brazil with good psychometric properties to identify ASD (Backes, Mõnego, Bosa, & Bandeira, 2014; Zaqueu, Teixeira, Alckmin-Carvalho, & Paula, 2015). These instruments have also been disseminated in protocols and documents made available by the government at no cost but to which Psychology students seem to lack access. These results found in a sample of students of Sao Paulo are a warning that concerns the education provided in the state and in other regions of the country, because specialized training is not the focus of most Psychology programs, as it is not the focus of programs in other health fields.

Most of this study's participants (89.8%) did not have knowledge concerning ASD epidemiological data, such as rate of prevalence, incidence according to sex, and occurrence of ASD among siblings. Epidemiological data are essential to planning diagnostic services and interventions, as well as to train human resources (Paula et al., 2012). Psychologists who do not have this knowledge are not prepared to work in the public health system or in education. Additionally, it is a concern that psychologists are not well-informed about recent studies, indicating there is an increased risk among family members of individuals with ASD (Zwaigenbaum et al., 2009).

Considering the importance of psychologists in the assistance provided to families of children with ASD, these professionals are expected to develop skills to treat children and handle the demands of families during their training years, as studies show the central role of parents in identifying and providing care to children with ASD (Bordini et al., 2014; Zanon, Backes, & Bosa, 2014). Thus, this study suggests that the topic of ASD epidemiology should be addressed in courses such as psychopathology, health psychology, and those in the field of research.

When the performance of students was compared according to the course year of the students, the 5th-year students scored better than the 1st-year students, with statistically significant differences in 14 of the 16 questions. This result is positive, as it shows increased knowledge, probably linked to the acquisition of scientific knowledge regarding ASD accruing from a content addressed by professors and/or by other academic activities. Note, however, the proportion of correct answers; none of the 295 participants answered more than 12 out of 16 questions correctly. ASD is a disorder that demands accurate knowledge of expected developmental milestones so that early identification is possible (Zanon et al., 2014) and, considering the important role played by psychologists in assisting people with ASD, the results fall short of expectations. Unfortunately, these results are in agreement with those reported in the literature, which, in general, indicate there is dissatisfaction with the general training provided by Psychology programs in Brazil; these programs are, then, considered to be deficient both in technical and in epistemological-scientific terms (Lisboa & Barbosa, 2009). The authors analyzed the curricula of 396 programs in all regions of Brazil and

verified there is a large number of Psychology colleges that have not seen quality improvement since the 1990s. Such a deficit is not exclusive to Psychology programs, as another study found the same gap in the training provided to students from the medical program of a college in Rio Grande do Sul, Brazil (Muller, 2012).

In general, this study's results indicate there is a need to improve the curriculum of undergraduate Psychology programs while considering curricular models that more clearly establish the connection between theory and practice (Abdalla, Batista, & Batista, 2008), without disregarding new scientific discoveries concerning the approach to and intervention in mental health problems. The goal is that, upon completion of their training, Psychology students are able to play an important role in public health services and also in education, being prepared to identify the early signs of ASD, as well as other childhood disorders.

It is known that Psychology training in Brazil has a general and interdisciplinary nature based on a common core established in the national curricular guidelines. On the one hand, it is a profession that is able to practice in different contexts, considering social and human rights' needs, aiming to promote the quality of life of individuals, groups, organizations, and communities (Ministério da Educação, 2011). On the other hand, the different undergraduate programs have the autonomy to choose the theoretical-methodological orientation that will ground the training of future professionals in the field (Silva Baptista, 2010). This duality generates conflicts depending on the theoretical-methodological choice that is emphasized during the program, in not all areas of the professional practice of a psychologist can be covered during undergraduate studies. Additionally, there is a certain level of resistance against evidence-based practices being taught to Psychology students in Brazil, even though authors have identified gaps in the guidelines concerning the practice of psychologists in the field of mental health, suggesting there is a common core that is more suitable for encouraging adaptation to the current demands of society (Ribeiro & Luzio, 2008).

This study's last result highlights the relevance of research during undergraduate studies, considering that those who had initiated scientific research in the field of mental health scored better than those who had not to that point been involved with any research project in the field (7.5 correct answers x 4.4 correct answers;  $p < 0.01$ ). In 2014, the Brazilian National Council for Scientific and Technological Development (CNPq) distributed 49,045 scholarships directed to all modalities (Master's degree, doctoral program, scientific research initiation, etc.); 41.11% of these were directed to scientific research initiation (20,164 scholarships). Data provided by the National Institute of Educational Studies and Research Anísio da Teixeira (INEP) shows that the number of students enrolled in Brazilian Psychology programs in the same year was 179,892, while a total of 2,625 (1.45%) scholarships were distributed (Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira, 2014). These results show that a minimal portion of these students, lower than the share identified in this study, have this experience. Thus, there is a need to increase investment in the field with research incentive programs during undergraduate studies.

Additionally, in accordance with the results presented here, authors indicate that initiating scientific research is a factor that contributes to the integral training of psychologists. According to Cruces & Maluf (2007), the need for improved qualification, as provided in the national curricular guidelines for undergraduate Psychology programs, has encouraged an increase in the production of research during undergraduate studies. Such effort, however, has not been sufficient to meet the demand for professionals graduating every year given the low student/CNPq scholarship ratio.

Finally, this study contributes to this field of knowledge but presents some limitations: (1) a convenience sample was used, so that the sample does not represent the students of private universities in the city of Sao Paulo and, for this reason, the findings reported here should be viewed with caution as they do not represent the level of knowledge concerning ASD held by the undergraduate students of other institutions; (2) so far, the questionnaire developed by the authors does not present evidence of validity, which decreases the study's internal validity. Future research is needed to address the validation of this questionnaire intended to measure knowledge of ASD; (3) indirectly assessing one's knowledge of ASD through a questionnaire does not ensure that the knowledge reported accrues from the programs' content or from other sources of information; (4) students who had completed their research projects did not report what the activity was or the time they had dedicated to it. Future research could address these aspects, as they could improve understanding regarding the role of scientific research initiation on these students' levels of knowledge compared to those who did not have such an experience. The limitations reported here do not belittle the results found but should be addressed in future studies to provide new contributions in the field of ASD.

## References

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- Abdalla, I. G., Batista, S. H., & Batista, N. A. (2008). Desafios do ensino de Psicologia clínica em cursos de psicologia. *Psicologia: Ciência e Profissão*, 28(4), 806–819. doi:10.1590/S1414-98932008000400012
- American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Association.
- Backes, B., Mônico, B. G., Bosa, C. A., & Bandeira, D. R. (2014). Psychometric properties of assessment instruments for autism spectrum disorder: a systematic review of Brazilian studies. *Jornal Brasileiro de Psiquiatria*, 63(2), 154–164. doi:10.1590/0047-2085000000020
- Bordini, D., Cavicchioli, D., Cole, C., Asevedo, G., Machado, F., & Paula, C. (2014). *Entendendo o autismo: uma visão atualizada da clínica ao tratamento*. São Paulo: Conectfarma.

- Brentani, H., Paula, C. S. de, Bordini, D., Rolim, D., Sato, F., Portolese, J., ... McCracken, J. T. (2013). Autism spectrum disorders: an overview on diagnosis and treatment. *Revista Brasileira de Psiquiatria*, 35(supl. 1), S62–S72. doi:10.1590/1516-4446-2013-S104
- Cruces, A. V. V., & Maluf, M. R. (2007). Psicólogos recém-formados: oportunidades de trabalho e atuação na área educacional. In H. Campos (Org.), *Formação em Psicologia Escolar: realidades e perspectivas* (pp.163–210). Campinas, SP: Alínea.
- Galdino, M. P., Pegoraro, L. F. L., Saad, L. O., Grodberg, D., & Celeri, E. H. R. V. (2018). Evidence of validity of the Autism Mental Status Examination (AMSE) in a Brazilian sample. *Journal of Autism and Developmental Disorders*. [Epub ahead of print] doi:10.1007/s10803-018-3530-0
- Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira (2014). *Sinopses estatísticas da educação superior – graduação*. Brasília: Inep. Recuperado em 12 outubro, 2018, de <http://portal.inep.gov.br/web/guest/sinopses-estatisticas-da-educacao-superior>
- Lisboa, F., & Barbosa, A. (2009). Formação em Psicologia no Brasil: um perfil dos cursos de graduação. *Psicologia Ciência e Profissão*, 29(4), 718–737. doi:10.1590/S1414-98932009000400006.
- Lord, C., Rutter, M., Dilavore, P., & Risi, S. (1999). *Autism Diagnostic Observation Schedule*. Los Angeles, CA: Western Psychological Services.
- Lord, C., Rutter, M., & Le Couter, A. (1994). Autism Diagnostic Interview-Revised: a revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism and Developmental Disorders*, 24(5), 659–685.
- Marques, D. F., & Bosa, C. A. (2015). Protocolo de avaliação de crianças com autismo: evidências de validade de critério. *Psicologia: Teoria e Pesquisa*, 31(1), 43–51. doi:https://dx.doi.org/10.1590/0102-37722015011085043051
- Ministério da Educação (2011). Resolução n. 5 de Diretrizes Curriculares Nacionais para os cursos de graduação em Psicologia. Recuperado em 12 outubro, 2018, de [http://portal.mec.gov.br/index.php?option=com\\_docman&view=download&alias=7692-rces005-11-pdf&category\\_slug=marco-2011-pdf&Itemid=30192](http://portal.mec.gov.br/index.php?option=com_docman&view=download&alias=7692-rces005-11-pdf&category_slug=marco-2011-pdf&Itemid=30192)
- Muller, C. (2012). *Conhecimento acerca do autismo em uma universidade do Rio Grande do Sul*. Dissertação de mestrado, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brasil.
- Noronha, A. P. P. (2002). Os problemas mais graves e mais freqüentes no uso dos testes psicológicos. *Psicologia: Reflexão e Crítica*, 15(1), 135–142. doi:10.1590/S0102-79722002000100015
- Paula, C. S., Belisário, J. F., Filho, & Teixeira, M. C. T. V. (2016). Estudantes de Psicologia concluem a graduação com uma boa formação em autismo? *Psicologia: Teoria e Prática*, 18(1), 206–221. doi:10.15348/1980-6906/psicologia.v18n1p206-221

- Paula, C. S., Cunha, G. R., Bordini, D., Brunoni, D., Moya, A., Bosa, C., Mari, J. J., Cogo, H. (2018). Identifying autism with a brief and low-cost screening instrument – Oera: construct validity, invariance testing, and agreement between judges. *Journal of Autism and Developmental Disorders*, 48(5), 1780–1791. doi:10.1007/s10803-017-3440-6
- Paula, C. S., Lauridsen-Ribeiro, E., Wissow, L., Bordin, I. A. S., & Evans-Lacko, S. (2012). How to improve the mental health care of children and adolescents in Brazil: actions needed in the public sector. *Revista Brasileira de Psiquiatria*, 34(3), 334–341. doi:10.1016/j.rbp.2012.04.001
- Reichow, B. (2012). Overview of meta-analyses on early intensive behavioral intervention for young children with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 42(4), 512–520. doi:10.1007/s10803-011-1218-9
- Ribeiro, S. L., & Luzio, C. A. (2008). As diretrizes curriculares e a formação do psicólogo para a saúde mental. *Psicologia em Revista*, 14(2), 203–220.
- Silva Baptista, M. T. D. da. (2010). A regulamentação da profissão Psicologia: documentos que explicitam o processo histórico. *Psicologia: Ciência e Profissão*, 30(sup. esp.), 170–191. doi:10.1590/S1414-98932010000500008
- Souza, J. C., Fraga, L. L., Oliveira, M. R. de, Buchara, M. dos S., Stralio, N. C., Rosário, S. P. do, & Rezende, T. M. (2004). Atuação do psicólogo frente aos transtornos globais do desenvolvimento infantil. *Psicologia: Ciência e Profissão*, 24(2), 24–31. doi:10.1590/S1414-98932004000200004
- Vivanti, G., Paynter, J., Duncan, E., Fothergill, H., Dissanayake, C., & Rogers, S. J. (2014). Effectiveness and feasibility of the early start Denver model implemented in a group-based community childcare setting. *Journal of Autism and Developmental Disorders*, 44(12), 3140–3153. doi:10.1007/s10803-014-2168-9
- Zanon, R. B., Backes, B., & Bosa, C. A. (2014). Identificação dos primeiros sintomas do autismo pelos pais. *Psicologia: Teoria e Pesquisa*, 30(1), 25–33. doi:10.1590/S0102-37722014000100004
- Zaqueu, L. da C. C., Teixeira, M. C. T. V., Alckmin-Carvalho, F., & Paula, C. S. de (2015). Associações entre sinais precoces de autismo, atenção compartilhada e atrasos no desenvolvimento infantil. *Psicologia: Teoria e Pesquisa*, 31(3), 293–302. doi:10.1590/0102-37722015032243293302
- Zwaigenbaum, L., Bryson, S., Lord, C., Rogers, S., Carter, A., Carver, L., ... Yirmiya, N. (2009). Clinical assessment and management of toddlers with suspected autism spectrum disorder : insights from studies of high-risk infants. *Pediatrics*, 123(5), 1383–1391. doi:10.1542/peds.2008-1606

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