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## Knowledge about autism by Polish future psychologists

### Abstract

The appropriate level of professional knowledge about autism is the fundamental factor of the adequate diagnosis, treatment, and professional service of children with autism and their families. Although research on the knowledge about autism was conducted in various professional groups and in many countries, not much of it is related to future psychologists and none to students of pharmacy. The aim of this study was to fill this gap. A total of 80 students participated in the survey (40 students of psychology and 40 of pharmacy) and filled in the Questionnaire on the knowledge of autism by Janikowska and Rychlewska. Two assumed hypothesis (1. the higher knowledge of symptom identification and therapy forms among psychology students than in pharmacy students; and 2. the lower knowledge of etiological factors and comorbid disorders among psychology students than in pharmacy students) were partially confirmed.

**Keywords:** autism, knowledge, future psychologist, future specialist of pharmacy

## Wiedza o autyzmie u polskich adeptów psychologii

### Streszczenie

Podstawowym warunkiem adekwatnej diagnozy oraz właściwego procesu leczenia i nauczania dzieci z autyzmem oraz wspierania rodziny jest odpowiedni poziom wiedzy profesjonalistów na temat autyzmu.

Badania na temat wiedzy o autyzmie prowadzone są w różnych grupach zawodowych w wielu krajach świata, lecz tylko nieliczne dotyczą przyszłych psychologów, a żadne nie obejmują studentów farmacji. Celem prezentowanych badań było więc uzupełnienie tego braku. W badaniu realizowanym przy użyciu *Kwestionariusza wiedzy o autyzmie* Janikowskiej i Rychlewskiej wzięło udział 80 studentów (40 studentów psychologii i 40 studentów farmacji). Wyniki potwierdziły częściowe postawione na wstępie dwie hipotezy: 1. Studenci psychologii charakteryzują się lepszą znajomością symptomów

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autyzmu i form terapii w porównaniu ze studentami farmacji natomiast 2. niższą wiedzą na temat czynników etiologicznych i chorób współistniejących.

**Keywords:** autyzm, wiedza, przyszli psycholodzy, przyszli farmakolodzy

## Introduction

Autism spectrum disorder (ASD), a neurodevelopmental disorder, has been found to start from early prenatal or postnatal impairments influenced by different factors. Since 2013, ASD has been defined on a behavioural basis and can be characterized by impairments in two areas: social interactions and communication (both reciprocal verbal and nonverbal), as well as a range of interests and activities (DSM-5). Currently, autism seems to affect more children than previously observed. Current epidemiological studies in the USA report ASD prevalence as 9,5% in children aged 3 through 5 and 9,1% in children aged 6 to 21 (Report, 2017). Detection of the factors responsible for such an increased prevalence of autism is fundamental for early prevention. However, ASD is conditioned and multi-factorial and it is not easy to eliminate causal determinants. The knowledge about the factors and mechanism of this impairment is very important for the whole population. Although ASD is a very serious and pervasive disease with very different processual dysfunctions, in the USA, most children with ASD are fully or partly included in regular classes, which allows more than 60% of them to graduate with a regular high school diploma between the age of 14 and 21 (Report, 2017). This most likely is possible thanks to early diagnosis and intervention, followed by better long-term cognitive and behavioural outcomes (Estes et al., 2015; Lazaratou, Economou, & Dikeos, 2017). Medical professionals (GP and pediatricians) are obligated to have adequate knowledge on behavioural and health problems related to this disorder. Early detection of ASD is currently a subject of wide interest (Crane, & Winsler, 2008; Zwaigenbaum et al., 2015). Professionals, as well as parents, are significant factors for effective treatment, therapy, and life-long education of people with ASD, enabling them to achieve positive effects of social participation and well-being. The level of preliminary knowledge is essential for the involvement of professionals and their appropriate diagnosis, applicable for special education and disability allowance. As a result, attention has been drawn to the problem of increased pressure on pediatricians and child psychiatrists (Skellern, Schluter, & McDowell, 2005; Taylor et al., 2016). Appropriate assessment and diagnosis empowers the family to understand the child's behaviour and to look for effective professional treatment. It is also a fundamental factor for parental stress reduction; despite being the beginning of a life-long path leading through intense contact with professionals, such as psychologists and teachers.

Research on the knowledge about autism was conducted in various professional groups and in many countries. The state-of-the-art knowledge about autism varied in reference to the professional experience of primary healthcare providers (family physicians, pediatrics, psychiatrists, nurses, healthcare workers, emergency wards medical staff, etc.) Studies on the knowledge about autism were carried out in Poland (Łęczycka, 1994, Pisula, 1998, Janikowska, Rylewska, 2010, Suchowierska, 2009; Suchowierska, & Walczak, 2013; Bandurska, Szmaglińska, Nowalińska, Zarzeczna-Baran, 2017), Spain (Martínez-Cayuelas et al., 2017), Canada and the USA (Dosreis, Weiner, Johnson, & Newshaffer, 2006; Rhoades, Scarpa, & Salley, 2007), Pakistan (Rahbar, Ibrahim, & Assassi, 2011; Imran, Chaudry, Azeem, 2011), in African countries such as Nigeria (Bakare et al., 2009; Iqwe, Ahanotu, Bakare, Achor, & Igwe, 2011; Esegbe et al., 2015) and Ghana (Sampson, & Sandra, 2018), as well as in China (Zhang, Xu, Zhang, Zhang, & Nie, 2018). Teachers' knowledge, especially in the context of introducing inclusive education, is also important for the proper processes of development, therapy, and education of a student with ASD to take place. Teachers' knowledge tests (special and subject-specific) provide significant information and indicate the need to be supplemented (Łęczycka, 1994; Pisula, Rola, 1998; Williams, Schroeder, Carvalho, & Cervantes, 2011; Chrzanowska, 2012; Shetty, & Rai, 2014; Liu et al., 2016; Ayub et al., 2017).

Health care professionals, as well as other medical staff, develop their professional knowledge and skills during extensive studies when they are involved in different theoretical and practical issues. This process should be as effective as possible. The knowledge of medical professionals is fundamental to develop reliable knowledge among students, who are preparing to fulfil their professional role (Kalyva, & Papageorgiou, 2004; Shah, 2011; Bakare et al., 2015; Low, & Zailan, 2018). The knowledge about autism among assisting people (including psychologists, psychology students, etc.) should be raised in order to meet the needs of people with ASD properly, especially considering that they have higher rates of unmet health care needs compared to the general population (Nicolaidis et al., 2012; Weiss et al., 2017).

It is worth investigating whether the level of student preparation in the field of autism is relevant to the state of contemporary scientific knowledge. The well-being of the people with whom they will have professional contacts or when volunteering for activities during their studies, should also be taken into consideration.

In Poland, a substantial amount of data on the knowledge about autism among students (nursery, psychology, medicine, education) and professionals (nursery workers, special and regular teachers, pediatricians) was collected by Łęczycka (1994). It was found that 62% of the tested individuals theoretically knew something about autism, but 23.4% of them never met

an autistic child. Almost half of the group neither knew the epidemiological rate nor the first symptoms onset. 21.7% of respondents acknowledged the damage to the central nervous system, as in the case of autism, although some blamed the mother for the emergence of ASD. Only a few of the tested individuals pointed to all of the characteristic autistic symptoms, while 20% took into consideration limited interactions with the social environment. Comorbid disorder as an intellectual disability, was not pointed by more than half of the respondents (57.2%). Methods to improve the functioning of people with autism were pointed by 57.7% of the respondents, and 41.8% of them mentioned the home environment as the best place for a child's development. 62.8% of the respondents did not point to any treatment that would help a child in typical functioning, although doctors and regular teachers mentioned music therapy, physical therapy, Sherborne Developmental Movement, psychotherapy, and medical treatment.

The medical professionals' knowledge, as the core background for appropriate diagnosis, was discussed in many studies (Suchowierska, 2009; Suchowierska, & Walczak 2013; Iqwe, Ahanotu, Bakare, Achor, & Igwe, 2011; Eseigbe et al., 2015), however, the results are not optimistic regardless of the geographical region (eg. Poland vs. Nigeria). What is confusing, is the incomplete knowledge of Polish pediatricians about autism, related neither to country nor region. The knowledge of Nigerian medical doctors (aged 26 to 60, general and psychiatrists working in public health facilities) examined with the KCAHW Questionnaire, an adequate assessment instrument, differentiated according to the administration area (Eseigbe et al., 2015). The lowest scores were obtained by doctors in the field of comorbid disorders, and the highest in the area of communication impairment symptoms. The cited studies showed the importance of improving the knowledge about autism among medical professionals to facilitate the diagnosis and challenges associated with the therapy of a person with ASD.

The KCAHW Questionnaire was also applied to Nigerian nurses (Iqwe et al., 2010; Iqwe et al., 2011). The level of the nurses' knowledge depended on their specialization; the psychiatric nurses' high result levels are comparable to those of pediatricians, due to their more intensive contact with ASD patients. Most nurses had knowledge about autism, the symptoms and medications, while communication symptoms and therapy forms remained outside their interest (Iqwe et al., 2011).

Undoubtedly, a low level of professional knowledge might trigger diagnostic mistakes and inappropriate treatment of the assessed child. Providing education to medical students and practicing doctors about the various aspects of autism would therefore be very useful, as their expertise will most likely lead to a better prognosis for autistic children.

Studies on the knowledge of autism among a group of psychology students, who had not participated in optional classes on autism, but were interested in the subject, were conducted by Pisula (1998). The results of the study indicate that a small percentage of respondents had contact with a person with autism (11%), and more than half of the respondents did not know the epidemiological indicators, although at the same time, they associated the disorder with the male gender. Most of the respondents correctly identified the triad of autism-related symptoms, as well as excessive crying. About 40% of respondents were unable to identify the causes of autism and 60% found them to be genetic or psychological factors. Unfortunately, a large proportion of psychology students thought that autism could be caused by a lack of parental love or personality disorder. As comorbid disorders, 27% of respondents mentioned schizophrenia and 16% referred to epilepsy. Knowledge about the possibilities of improving the development of a child with autism in the subjects varied, although the majority of them rightly recognized that it is not possible to outgrow autism. 44.3% thought developmental opportunities and the ability to function optimally to be high, but at the same time, the remaining respondents claimed that developmental chances are low, suggesting only 10–15% of people with autism can function independently. As an environment conducive to improving the development of a child with autism, the respondents usually indicated the family home and specialist therapeutic centres. At the same time, 50% of them emphasized the validity of integration. Although the knowledge of psychology students about autism was not complete and reliable, 87% of them declared their willingness to work with people with autism. Later studies showed a difference between the students' (medicine and psychology) knowledge about autism (Janikowska, Rychlewska, 2010) depending on the field of study. The views on the etiology of autism have been changed in the temporal context. Neurobiological disorders (50% of medical students, 43% of psychology students) and genetic factors or pregnancy and childbirth complications, were considered as the main cause of autism. Only a few students regarded the lack of love, warmth, or the personality disorder of the parent, as the cause of autism. On the other hand, unfavourable effects of crossed vaccines were identified as the cause of autism by 13.6% of medical students and 5.6% of psychology students. More than half of medical students and about 26% of psychology students believed that the period from 13 to 24 months of the child's life is the time of the first symptoms of ASD, while 11.6% of future doctors and 15.2% of future psychologists pointed to the period between 18 and 36 months. As the most common symptoms, students identified disorders in social relations, self-aggression, sensory hypersensitivity, limited interests, and stiffness of the child's behaviour. As a phenomenon associated

with autism, savantism (55.2% medical students, 47.2% psychology students) and intellectual disability (45% of all respondents) were identified. A clear difference between medicine and psychology students occurred in identifying incidence rates: medical students – 1 in 10,000 people, and psychology students – 5 in 10,000 people. Disturbing results were obtained as far as the knowledge of forms of therapy is concerned: 7.2% of medicine students and 75.2% of psychology students did not mention any of them. About 90% of the respondents defined the level of their knowledge as low and were not particularly interested in expanding it.

Taking the results of studies from other countries into consideration (Ukraine and Nigeria), it is claimed that the knowledge of psychology students about autism has to be supplemented and improved (Tarnavska, 2012; Igwe et al., 2010). The research also revealed a low level of knowledge about autism among graduates of medicine, nursing, and psychology in Nigeria. The groups of graduates differed significantly in the three areas of knowledge about autism (social interactions, stereotypical behaviours, comorbid disorders). Generally, it can be stated that a higher level of knowledge was demonstrated by graduates of medicine than those of nursing, and the lowest level was presented by future psychologists, due to the fact that pediatrics and psychiatry were implemented in the university study curriculum.

The aim of the presented research<sup>2</sup> was to determine the level of knowledge about autism as presented by students of psychology and pharmacy. These individuals, in their professional carrier, will interact with ASD patients in the form of diagnostic and therapeutic activities, they will carry out clinical trials testing new drugs, or will trade registered drugs, if working in the pharmaceutical sector. This is the essential evidence to assess the level of knowledge among students in the middle of their master's courses in order to make improvements to the process of specialized education, before the end of the tertiary education. Due to the varied scope of subjects including content related to autism, depending on the specialization of studies, the following hypotheses have been put forward:

H1: The level of knowledge about autism in the aspects of symptom identification and therapy forms is higher in psychology students than in pharmacy students.

H2: The level of knowledge about autism in the area of etiological factors and comorbid disorders is lower in psychology students than in pharmacy students.

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<sup>2</sup> Data was collected by the second author under the supervision of the first author and presented in K. Sarlej (2017). *Wiedza o autyzmie wśród studentów psychologii i farmacji*. Kraków: Uniwersytet Pedagogiczny, unpublished bachelor thesis under supervision of Dr J. Kossewska.

## Method

### *Participants*

Students who participated in the study were studying in Cracow. A total of 80 individuals participated: 40 second-year psychology students (N=40, 32 females and 8 males, aged 19 to 23) and 40 second-year pharmacy students (N=40, 36 females and 4 males, aged 18 to 23). Most of the participants involved in the survey had no contact with autistic persons (22,5% psychology students, 70% pharmacy students), however some of them had an occasional contact (15% psychology students, 22,5% students pharmacy). The tested subjects felt their knowledge on autism was rather low and based on university lectures (50% psychology students, 2,5% pharmacy students).

### *Instrument*

In the presented study, the Questionnaire on the knowledge of autism by Karolina Janikowska and Paulina Rychlewska (2010) was used<sup>3</sup>. The questionnaire was a modified version of an assessment method used by Ewa Pisula (1998). It consisted of 16 questions referring to fundamental issues in the field of autism (e.g., diagnostic criteria of autism, etiological factors contributing to autism prevalence, comorbid disorders and developmental prognosis for people with autism, effective therapeutic methods, the epidemiological indicators, and the behavioural characteristic of the people with autism).

The study was carried out between February and April 2017. Pharmacy and psychology students of Cracow universities were informed about the aim of the survey during their regular classes and invited for individual testing. After preliminary assessment, the time and place of individual contact with the second researcher was fixed. The second researcher met individually with each participant in a quiet place to fill the self-administered questionnaire anonymously by circling one of the answer options – “yes” or “no” – to a given statement. Completing the questionnaire took approximately 30 minutes.

## Results

Students' knowledge about the autistic symptoms onset was reliable – the majority of the students identified the first symptoms in the first three years of the child's life, although there were some differences depending on the field of study: first symptoms between 13 and 24 months (42.5% pharmacy

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<sup>3</sup> The authors would like to acknowledge Karolina Janikowska and Paulina Rychlewska for their consent to use the “Questionnaire on the knowledge of autism” in the present study.

students, 22.5% psychology students), first symptoms between 6 and 12 months (30% psychology students, 27.5% pharmacy students), first symptoms between 18 and 36 months (10% pharmacy students, 17.5% psychology students), first symptoms between 20 and 36 months (2.5% psychology students, 5% pharmacy students). At the same time, a quarter of respondents emphasized that it is difficult to identify any pattern that would accurately determine the first symptoms of autistic disorders (22.5% of psychology students, 20% of pharmacy students).

The knowledge of epidemiological indicators occurred independently of the field of study: 5/10 000 births (62.5% of pharmacy students, 52.5% of psychology students), 8–9 / 10,000 births (17.5% of pharmacy students, 22.5% of psychology students), 16/10 000 births (17.5% pharmacy students, 2.5% psychology students). Regardless of the field of study, the respondents identified autism as a disorder independent of racial and geographical factors (72.5% psychology students, 65% pharmacy students). However, a significant difference between the students in the tested groups was related to the relationship between autism and gender: pharmacy students (55%) more often than psychology students (20%) claimed that ASD was equally common in both sexes, while psychology students (47.5%) more often than pharmacy students (30%) claimed that autism was more common in boys.

Members of both groups presented a varied level of knowledge about symptoms of autism. The percentages and differences between the examined groups are presented in Table 1.

Table 1. The knowledge about symptoms of autism in the context of the field of study (psychology vs. pharmacy).

Autism symptoms	Psychology Students	Pharmacy Students	Group differences
Cognitive deficits	90%	100%	n.s.
Self-aggression	27,5%	22,5%	n.s.
Sensory sensitiveness	55%	75%	Z=2.052, p=0.040
Limited interests	60%	32,5%	Z=2.467, p=0.013
Behaviour inflexibility	65%	37,5%	Z=2.460, p=0.014
Lack of verbal communications	37,5%	12,5%	Z=2.562, p=0.01
Echolalia	42,5%	35%	n.s.
Abnormal motor development	35%	27,5%	n.s.
Abnormal EEG	25%	12,5%	n.s.
Eating and sleep disorders	10%	22,5%	n.s.

n.s. – non significant

source: modified data based on Sarlej, 2017

The respondents correctly identified the symptoms of autism, although there are significant differences between the groups in the frequency



of identifying such symptoms as: sensory sensitiveness ( $Z=2.052$ ,  $p=0.040$ ; 55% psychology students; 75% pharmacy students), limited interests ( $Z=2.467$ ,  $p=0.013$ , 60% psychology students, 32,5 % pharmacy students), behaviour inflexibility ( $Z=2.460$ ,  $p=0.014$ ; 65% psychology students, 37,5% pharmacy students), lack of verbal communications ( $Z=2.562$ ,  $p=0.01$ ; 37,5% psychology students, 12,5% pharmacy students). Other symptoms were identified independently of the field of study: cognitive impairments, echolalia, abnormal motor development, eating and sleep disorders, as well as abnormal brain activity.

Students from both tested groups showed an adequate level of knowledge regarding the etiology of autism. Percentages and differences between the groups are presented in Table 2.

Table 2. The knowledge on autism etiology in the context of the field of study (psychology vs. pharmacy).

Aetiological factors	Psychology Students	Pharmacy Students	Group differences
Neurobiological impairments	62,5%	55%	n.s.
Genetic factors	85%	82,5%	n.s.
Poligenetic impairment	55%	90%	$Z=3.505$ , $p=0.001$
Prenatal and perinatal factors	42,5%	42,5%	n.s.
Combination vaccines	15%	42,5%	$Z=2.717$ , $p=0.006$
Early intoxication	17,5%	25%	n.s.
Parental failures	7,5%	2,5%	n.s.
Lack of parental love	2,5%	10%	n.s.
Nutritional factors	0%	10%	$Z=2.052$ , $p=0.040$
No answer	15%	12,5%	n.s.

source: modified data based on Sarlej, 2017

In the presented study, respondents correctly identified ASD etiological factors, although there were significant differences between groups in the frequency of identifying: polygenetic impairments ( $Z=3.505$ ,  $p=0.001$ , 55% psychology student, 90% pharmacy students), combination vaccines ( $Z=2.717$ ,  $p=0.006$ , 15% psychology students, 42,5 pharmacy students), nutritional factors ( $Z=2.052$ ,  $p=0.040$ , 0% psychology students, 10% pharmacy students). Other factors were mentioned with similar intensity: genetic factors (85% psychology students, 82,5% pharmacy students), neurobiological impairments (62,5% psychology students, 55% pharmacy students), prenatal and perinatal factors (42,5%), early intoxication (17,5% psychology students, 25% pharmacy students), parental failures (7,5% psychology students, 2,5% pharmacy students), lack of parental love (2,5% psychology students, 10% pharmacy students).

Comorbid disorders, that were identified by the respondents, are shown in Table 3.

Table 3. The knowledge about comorbid disorders in the context of the field of study (psychology vs. pharmacy).

Comorbid disorders	Psychology students	Pharmacy students	Group differences
Epilepsy	27,5%	37,5%	n.s.
Obesity	2,5%	5%	n.s.
Left-handedness	22,5%	25%	n.s.
Congenital cytomegaly	5%	2,5%	n.s.
Congenital rubella	0%	5%	n.s.
Fragile X chromosome syndrome	10%	10%	n.s.
Down syndrome	12,5%	7,5%	n.s.
Incontinentia pigmenti achromians	2,5%	2,5%	n.s.
Neonatal herpes infection	5%	2,5%	n.s.
Sight and hearing impairments	2,5%	7,5%	n.s.
Increased excretion of uric acid	2,5%	12,5%	n.s.

source: modified data based on Sarlej, 2017

Disorders coexisting with autism were identified by the respondents to a similar degree, regardless of the field of study. For the most common comorbidity, the subjects considered epilepsy (27.5% students of psychology, 37.5% students of pharmacy) and left-handedness (22.5% psychology students, 25% pharmacy students). Other disorders mentioned in the questionnaire (obesity, congenital cytomegaly, congenital rubella, fragile X syndrome, Down's syndrome) were identified by a few people. Intellectual disability is a very important phenomenon among ASD individuals, resulting in the need to undertake the appropriate comprehensive therapy. Intellectual disability was the most frequently identified disorder coexisting with autism, regardless of the participant's field of study (75% students of psychology, 65% students of pharmacy). Students of psychology significantly more often recognized that autism coexists with mild intellectual disability ( $Z = 2.813$ ,  $p = 0.005$ ) and that it is accompanied by extraordinary abilities (savantism) ( $Z = 3,134$ ,  $p = 0.002$ ), while students of pharmacy attributed above-average intelligence to autism ( $Z = -3.553$ ,  $p = 0.001$ ) (Tab.4).

Table 4. The knowledge about cognitive deficits in autism in the context of the field of study (psychology vs. pharmacy).

Intelligence	Psychology students	Pharmacy students	Group differences
Intellectual disability	65%	75%	n.s.
$IQ < 50$	5%	17,5%	n.s.

50<II<70	50%	20%	Z=2.813, p=0.005
80<II<100	40%	32,5%	n.s.
II>120	5%	37,5%	Z=-3.553, p=0.001
Savant syndrome	65%	32%	Z=3.134, p=0.002

Source: modified data based on Sarlej, 2017

In the context of the complexity of behavioural problems and the diversified symptomatology of autism, it is important to choose the adequate therapy methods. The knowledge about forms of therapy is presented in Table 5.

Table 5. The knowledge about the therapy treatments used in autism in the context of the field of study (psychology vs. pharmacy).

	Psychology students	Pharmacy students	Group differences
Medical treatment (pharmacotherapy)	0%	0%	n.s.
ABA methods	17%	15%	n.s.
Hippotherapy	7.5%	22%	Z=3.053, p=0.01
Music therapy	12,5%	2.5%	n.s.
Sensory integration	10%	2,5%	n.s.
Psychotherapy	5%	2,5%	n.s.
No answer	47,5%	55%	n.s.

Source: modified data based on Sarlej, 2017

Regardless of the field of study, half of the respondents were unable to identify any forms of therapy applied to people with autism. Also, their field of study did not make any difference when it came to their knowledge about methods based on empirical evidence and psychotherapy, particular methods were indicated by a small group of respondents (behavioural method: – 17% students of psychology, 15% students of pharmacy; psychotherapy: 5% students of psychology, 2.5% students of pharmacy). The respondents (both students of psychology and of pharmacy) did not identify pharmacology as a method of treating autistic disorders. However, in reference to the field of the study, only one result was significant. Students of pharmacy, in comparison with students of psychology, significantly more often pointed to hippotherapy as an appropriate treatment for autistic persons.

## Discussion

The research carried out using the questionnaire developed by Janikowska and Rychlewska (2010) allowed for the comparison of knowledge about autism among future specialist in Poland (psychology students vs. pharmacy students) in the temporal context. The observed changes may indirectly be related to the introduction of the DSM-5 classification. Currently, autism

spectrum disorder diagnosed in the DSM-5 classification falls into the superior category of Neurodevelopmental Disorders, as postulated by many authors based on contemporary study results (Pisula, 2012; Volkmar & Reichow, 2013; Thapar, Cooper, & Rutter, 2017). Due to the lack of implementation of relevant specialist subjects during the course of studies, second-year students of psychology and pharmacy may not have yet learned about this medical classification. The introduction of DSM-5, however, has become a media reality, just as autism is commonly present in the public space through different social campaigns (World Autism Day, Autism Week, etc.).

Autism is a multi-factorial neurodevelopmental disorder (Pisula, 2012), that can be correctly identified based on a vast majority of course subjects, regardless of the field of study. The results obtained indicate that future specialists' knowledge is dominated by the polygenic and prenatal etiology of autism. Leo Kanner (1943) was the first to argue that the symptoms of autism are present from child birth, so their origin must be associated with an abnormal course of prenatal development. The respondents, more often than in later studies (Pisula, 1998; Janikowska, Rychlewska, 2010), included vaccines as a factor in the etiology of autism. This was particularly pronounced by pharmacy students (in comparison with psychology students), and can be interpreted as a disturbing effect of false media reports about the potential harmfulness of vaccinations, inspired by unreliable research results based on insufficient samples, uncontrolled design, and concluded in an unfair and rather speculative way (Wakefield et al., 1988). Although epidemiological studies were immediately performed and gave clear evidence of no relationship between vaccination and autism (Taylor et al., 1999; Dales, Hammer, & Smith, 2001; Foster, & Ortiz, 2017), vaccination rates began to decrease as a result of many parents' concern. The negative effect of this socially harmful and dishonest practice is still visible in the increase of endemic infectious diseases among children (Communicable Disease Threats Report, 2018).

Students of psychology, more often than students of pharmacy, linked intellectual disability with autism and also associated autism with the occurrence of extraordinary abilities (savant syndrome). Their results may be influenced by the best-known autistic savant portrayed by Dustin Hoffman in the 1988 movie *Rain man*. However, only one in 10 ASD individuals has such abilities, and they are not specific only to autism, but may occur in other developmental disabilities related to injury or disease of the central nervous system (Treffert, 2009).

The methods of therapy for people with autism are far beyond common knowledge, which is why half of the respondents were unable to identify any. The other half of the respondents mentioned intermittently some forms of therapeutic interventions. However, the field of study does not have any

impact on the knowledge about the forms of therapy in autism, as was assumed. Although, it seems that students of pharmacy should be familiar with psychopharmacology from the beginning of their studies, they are not. Drug treatment is however, the appropriate treatment to reduce various symptoms and comorbid disorders, although not autism per se (Vetulani, 2013).

The results obtained indicate that it is necessary to undertake activities aimed at analysing knowledge about autism among people preparing for the job of health care professions, which coincides with the results of research conducted in other groups (Suchowierska, 2009; Suchowierska, & Walczak, 2013). It is especially important for specialists (medical doctors, pharmacists, psychologists, physiotherapists, teachers and special teachers) and students who receive training in these fields during their university studies to improve their knowledge about autism, (Kalyva, & Papageorgiou, 2004) in order to have the appropriate level of knowledge to accompany and support people with autism in their future professional practice.

It could be concluded, that both tested hypothesis (1 – the higher knowledge of symptom identification and therapy forms in psychology students than in pharmacy students; and 2 – the lower knowledge of etiological factors and comorbid disorders in psychology students than in pharmacy students) were partially confirmed.

Students of psychology more often identified symptoms of verbal communication impairment and limited patterns of behaviour, but did not reveal any greater knowledge of therapy methods. However, pharmacy students more often identified symptoms of sensory hypersensitivity. Students of pharmacy significantly more often identified the appropriate biological factors (polygenetic, nutritional). They did however, also point to vaccines, which is inconsistent with the current state of medical knowledge (Destefano & Thompson, 2004; Uno, Uchiyama, Kurosawa, Aleksic, & Ozaki, 2012), although present in the varied attitudes of mothers towards vaccines (Świętoniowska & Rozensztauch, 2017) and related to their level of education (Kowalska, Gajda, Barański, & Braczkowska, 2018). In contrast, co-morbidities were identified independently of the field of study, with the exception of intellectual disability, which students of pharmacy associated with autism less frequently than students of psychology.

Although interesting results were obtained, there are also some limitations of the presented research. The research was conducted in small groups, which makes the generalization quite limited. It would be necessary to broaden the surveyed groups and randomly select students from all Polish universities educating in psychology and pharmacy. Increasing the number of groups would also make it possible to identify the factors diversifying the

level of knowledge about autism, such as gender, contact with people with ASD, year of study, as well as particular specialization.

The research instrument created by Polish researchers (Janiszewska, Rychlewska, 2010) was applied, which made it possible to interpret the results in a temporal context, however, due to the possibility of multiple choice, the results are difficult to relate to those obtained by other authors. It would be interesting, therefore, to conduct research based on the KCAHW (Knowledge About Childhood Autism Among Health Workers) questionnaire, which would allow for the assessment of the subjects' knowledge and the precise comparison with the results from other countries.

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