Autism Knowledge and Stigma among College Students

at the University of Wisconsin – River Falls

By

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Abstract:

As the prevalence of autism spectrum disorder increases, it is important for students entering the workforce to increase their overall knowledge and decrease stigma surrounding autism. The purpose of this study was to assess current university student's knowledge and stigma of autism through the use of the Autism Stigma and Knowledge Questionnaire (ASK-Q; Harrison, Bradshaw, et al., 2017). The mean scores of each subdomain (diagnosis-15.33, etiology-14.02, treatment-12.70, and stigma-6.65) fell within the normal range, which indicated high prevalence of adequate knowledge and low stigma. The data was compared to previously published data (Stronach et al., 2019). The results of this study indicate that adequate knowledge of autism will assist in the reduction of the stigma surrounding autism.

Introduction

Background

The diagnosis and prevalence of autism has grown over the last two decades. The American Psychiatric Association (2013) defines autism spectrum disorder as a developmental neurological disorder that is characterized by patterns of rigid and repetitive behaviors in addition to social and communicative deficits. Autism is considered a spectrum disorder because its symptoms and their severity vary from individual to individual. According to the Centers for Disease Control (CDC; 2020), approximately one in fifty-four children is diagnosed with autism, with boys being diagnosed at a rate of four to one when compared to girls. Most children are diagnosed by age four (CDC, 2020), but early detection has found children can be diagnosed as early as two years old (Self et al., 2010). Autistic individuals have distinguished, yet varying, behaviors and areas of development stereotypical of the disorder. These include restricted interests, repetitive behaviors, social and behavioral functioning deficits, and impaired language development (Schohl et al., 2014).

Students with Autism and School

As children with autism enter school, social and behavioral deficits can impact peer relationships and can cause children to feel embarrassed and withdrawn from their normal developing peers (Underhill et al., 2019). To overcome these difficulties, professionals have researched different methods to assist these children in increasing their peer interaction and ways to have appropriate relationships. Two examples of these methods include play script and PEERS intervention. Social play scripts encourage peer interaction between children with autism and their typically developing peers (Hundert et al., 2014). These scripts can be used for a specific themed activity that is easy for the child to follow and allows for appropriate social interactions. In 2014, Hundert and colleagues conducted an experiment to see if introducing social scripts and a peer buddy program would increase the children's interactions. They found that in opportunities where activities followed a social script, the children with autism had an increase in peer interaction compared to when the children had no themed activities (Hundert et al., 2014). They also found peer buddies also had a positive impact on the overall interactions of the children involved.

Introducing Program for the Education and Enrichment of Relational Skills (PEERS) intervention is another way to increase peer interaction and improve social skills in children with autism (Schohl et al., 2014). This intervention method is used to teach adolescents with autism the skills needed to make and maintain friendships. PEERS has three aspects that are distinctive to the program. The first is to teach social skills in a small group. In these small groups, students are taught social skills through different strategies such as role playing, modeling, and weekly socialization assignments. Next, PEERS focuses on incorporating parents in the teaching of social skills. Parents can have a profound impact on their child's social skills and can serve as

social coaches for their children. The final aspect is teaching social etiquette rules. PEERS uses

concrete social interaction examples to teach students appropriate social skills (Schohl et al.,

2014).

Students with Autism and College

According to the United States Department of Education (2016), the number of school-

age students diagnosed with autism has increased from below 9,000 in 2000 to 500,000 in 2014,

with approximately 50,000 graduating from high school. Earlier detection and intervention

strategies for autism have helped improve academic success and have allowed more autistic

individuals to seek postsecondary opportunities (Gillespie-Lynch et al., 2015).

As more students with autism are admitted into colleges and university, there will be an

increased need to provide services to help them better transition into college life. In 2010, the

United States Department of Education provided funding for twenty-seven schools across the

country to create Transition Programs for Students with Intellectual Disabilities (TPSID;

Glickman, 2010). These programs would provide students with intellectual disabilities with

access to academia, employment training, and assistance with independent living (Nevill &

White, 2011). Colleges could also incorporate Comprehensive Transition and Postsecondary

(CTP) programs which focus on academic enrichment, independent living skills, self-advocacy,

socialization, integrated work experiences and career skills (White et al., 2019).

Barnhill (2016) administered a survey to thirty post-secondary colleges and universities

to inquire the services they provided for individuals with autism. Sixty-three percent of those

surveyed indicated their services assisted with life skills, social skills, and peer mentors. Other

schools provided accommodations for mental health, anxiety management, and sensory needs

(Kuder & Accardo, 2018). Seven of the thirty schools offered transitional programs for students

with autism. These programs included a six-week summer orientation opportunity where individuals were paired with senior peer mentors and attended condensed course to assist with the transition to college (Burnhill, 2016).

In 2014, a study was conducted at a small liberal college to determine the benefits of a transitional program for incoming students diagnosed with autism (Shmulsky et al., 2014). The program included various strategies to assist with the transition. These steps consist of contacting the student through Disability Services to determine what needs the student would have, small orientations prior to the start of the school to help the student become better acclimated to the school and reduce potential anxieties and collaborating with skilled advisors who understand the disorder and can provide feedback on academics (Shmulsky et al. 2014). During this study, thirty students were followed throughout their first academic year as their participated in this transitional program. At the end of the year, twenty-seven of the thirty students successfully completed their first academic year with a cumulative GPA of 2.74, which was higher when compared to the cumulative GPA of all incoming freshman at the school, 2.58 (Shmulsky et al., 2014).

College Students and Autism Stigma

With an increase of students with autism pursuing postsecondary opportunities, the challenges they face during this transitional time have also increased. These challenges include increases of independence, living in a residence hall, and meeting academic demands (Van Hees et al. 2015). Non-academic challenges can also be problematic including difficulties with social and interpersonal skills, time management deficits, lack of self-advocacy, and sensory overload (Van Hees et al., 2015). Students may also worry about peers' and professors' lack of

understanding of their disorder, not feeling connected or socially integrated with their peers, and not wanting their disorder to define them (White et al., 2019).

A study conducted by Jackson et al. (2018) surveyed fifty-six individuals with autism who were currently enrolled in a post-secondary program. The survey included questions about their academic experiences, social experiences, and mental well-being. When asked about their comfort level with their academic load, 48% of students surveyed reported feeling comfortable about their workload whereas 21% did not. As for using academic services, 30% of the students indicated the need for more or better services than what their school offered. When asked about social interactions, half of the students reported feeling satisfied with the number of close friendships they had, but 58% reported not having a romantic relationship while in school. Thirty-two of the students surveyed also reported having at least one psychiatric diagnosis in addition to their autistic diagnosis. These diagnoses included depression (35%), generalized anxiety (33%), social anxiety (26%), and attention deficient hyperactive disorder (23%; Jackson et al., 2018).

These challenges have prompted researchers to hypothesize whether an increase of knowledge on college campuses about autism will decrease overall stigma towards autistic individuals and increase social acceptance. To test this hypothesis, research conducted by Gillespie-Lynch et al. (2015) surveyed college-aged students to gauge their understanding of autism and their overall perception of autistic individuals. In this study, 365 students participated in an online autism training as well as a pre- and post-test to assess their knowledge and any potential stigma the students may have. The test included a social distance-scale and closed-ended questions about autism knowledge. The social distance scale measured the participant's willingness to engage with an individual on the autism spectrum at various levels of intimacy.

These intimacy levels ranged from working on a project to having a romantic relationship (Gillespie-Lynch et al., 2015). The close-ended questions measured the participants' knowledge by using a Likert scale to rate thirteen potential autism facts, such as males are more likely to be diagnosed than females. After completing the pre-test, each student participated in an online training. The training included information about diagnosis, signs, ethnic, disparities, socioeconomic factors, and potential etiology.

When measuring overall stigma towards autistic individuals, women showed to have more positive attitudes (Gillespie-Lynch et al., 2015). Gillespie-Lynch et al. found after participating in the online training, the student's knowledge of autism did increase compared to results from the pre-test. Students became more aware of socioeconomic disparities surrounding autism, such as those with higher socioeconomic status and in richer, more educated countries were more likely to be diagnosed (2015).

In a similar study, White et al. (2019). surveyed 214 college students over a five-year period: 111 in 2008 and 103 in 2013. Researchers measured each participant's general connection with someone who has autism through the use of the Autism Spectrum Disorders and Higher Education Questionnaire. These connections range from knowing someone or was related to someone on the autism spectrum to interacting with a someone in class (White et al., 2019). The next section measured the participants' knowledge of autism. This included thirty-one behaviors they might expect a peer to do in class. Fifteen were behaviors someone may exhibit on the autism spectrum and sixteen were behaviors not typically associated with autism. These behaviors included aggressive, disruptive, observable, and cognitive behaviors (White et al., 2019). The last part of the survey measured the participant's attitude toward autistic individuals. Students were presented a list of behaviors accurately associated with someone on the spectrum

as well as a list of potential interactions and were asked to use a Likert scale to measure how willing they were to engage.

The results of this study also found that women to have higher positive attitudes towards autism as well as students who associated more misleading traits, such as aggression or cognition impairments, were also less likely to display positive attitudes towards autistic individuals (White et al., 2019). Those who were in science and technology majors reported more negative attitudes towards interacting with autistic individuals. Researchers also found those who knew someone on the autism spectrum were less likely to have negative attitudes. Students were more willing to participate in classroom activities with autistic individuals but were less likely to engage in romantic relationships.

It is important to consider the knowledge of college students who are pursuing degrees in health care professions when it comes to autism. A study conducted by Freedman (2012) surveyed two hundred and fifty-two students to determine if the number of courses related to autism and previous experience or if knowing someone with autism would affect their overall knowledge. The results of the study showed 94% of the students surveyed stated they might pursue a profession where they would work with autistic individuals. Despite this high percentage of students stating they would like to work with this population, only 8.73% of the responses indicated they had been exposed to any sort of information regarding autism within their coursework, whereas 40.1% have had no knowledge of autism from course work (Freedman, 2012). These results are concerning from the standpoint that these students are not receiving quality education regarding autism and therefore, could be continuing misconceptions when they are in the healthcare field.

Professional Knowledge of Autism

As students enter the professional field, it is important for them to be knowledgeable about the autistic population, so they help screen and diagnosis the symptoms sooner. Even though autism awareness has increased over the last two decades, children are still not being diagnosed at an early enough time in order to qualify for services (Self et al., 2010). Researchers have found a significant gap between when parents address concerns and their child actually being diagnosed by a professional, sometimes spanning three to five years. Another study revealed that the average age of initial evaluation is four years, but the average age a child is formally diagnosed isn't until after their fifth birthday (Self et al., 2010).

This delay in identifying autism in younger children could be related to the diagnostic process and that autism does not have physiological symptoms associated to the disorder (i.e. anatomical abnormalities) which can making a definite diagnosis challenging. Possible other factors that may delay an initial diagnosis of autism could be either a professional's hesitation to either misdiagnosis or overall reluctance to make the diagnosis (Self et al., 2010).

As college students enter the workforce, they need to be able to recognize and comfortably identify markers associated with autism in order to get children timely referrals and accurate diagnoses. Self et al. (2010) surveyed two hundred and twelve physician assistants, occupational therapists, physical therapists, and speech-language pathologists to determine if they felt prepared in their pre-professional courses to accurately identify characteristics associated with autism. Speech-language pathologists and occupational therapists reported the highest number of responses indicating pre-professional courses that covered information about autism and identifying signs and characteristics. When asked about screening for autism, majority responded that their pre-professional course did not include it (Self et al. 2010).

In a follow up study, Self et al. (2015) surveyed three hundred ninety-six family physicians and pediatricians to determine if they were following the American Academy of Pediatrics (AAP) guidelines for screening autism timeline. According to the AAP (2007) guidelines, it has been recommended children are screened at both their 18-month and 24-month well-checks. When asked, only sixty-six (17%) participants indicated they follow AAP guidelines and routinely screen for autism at 18- and 24-months, whereas one hundred sixty-two (41%) of participants stated they do screen for autism, but do not follow the AAP guidelines. The remaining one hundred sixty-eight participants (42%) stated they do not screen unless a concern was raised about a child potentially having autism (Self et al., 2015). Of those who did not regularly screen for autism cited various barriers that prevented them from screening. These barriers included familiarity with the disorder, the knowledge of available resources to aid with the diagnosis, and overall confidence in diagnosing autism (Self et al. 2015).

Poor education and lack of knowledge within the professional field regarding autism has a great impact on early detection and referring children to be assessed. In another study, Atun-Einy and Ben-Sasson (2018) also conducted a questionnaire regarding professional's clinical self-efficacy and how it interacted with their autism experience and knowledge. Participants consisted of eighty-five occupational therapists, eighty-two physical therapists, and sixty-seven speech-language pathologists. Majority of the clinicians indicated higher self-efficacy when providing services either for diagnostic or intervention purposes. The study also found that more experienced professionals reported higher levels of comfort in screening, diagnosing, and treating children with autism indicating that knowledge may be acquired over time rather than learning it in classes.

Racial Disparities

According to the CDC (2020), the prevalence ratio of autism between White and non-White children in the United States has decreased in recent years. Though these rates suggest that prevalence does not differ across these groups, studies have shown that racial and ethnically diverse children, specifically Hispanic, Black, and Asian individuals, are less likely to be diagnosed at an earlier age compared to their non-Hispanic White counterparts. Further research has also found that when these children are eventually seen, they are more likely to be diagnosed with other disorders such as ADHD or conduct disorders (Mandell et al. 2007, cited in Tek & Landa, 2012). Possible reasons for these disparities could include the socioeconomic status and educational levels of parents as well as cultural and linguistic backgrounds. For example, in Western culture, significant milestones of neurotypical development is a child's ability to participate in joint attention (i.e. pointing at an object or sharing eye-contact to indicate indent). However, in Eastern culture, finger pointing is not a common practice and sharing eye contact with authority figures (caregivers) is considered disrespectful. These differences in cultural milestones for neurotypical development can have significant impact on whether a child is assessed for autism and at what age.

Cross-Cultural Autism Study

In Western cultures, the increase of education and discussion of autism over the past two decades has assisted in decreasing overall stigma towards the disorder. However, in more Eastern cultures, autism is still stigmatized and autistic individuals may be more ostracized. To assess and compare levels of stigma among university students, Gillespie-Lynch et al. (2019) conducted a study between college students in the United States and Lebanon. Researchers used various autism knowledge tools when conducting this study. These materials included the autism

awareness survey, which used a five-point Likert-type scale to rate thirteen different autism statements; the autism social distance scale, and the cultural orientation scale, which is a 16-item tool that compares individualism to collectivism (Gillespie-Lynch et al.,2019). The results of this study found Lebanese students indicated elevated levels of social distancing rates that those of the American students. It was also reported overall lower levels of autism knowledge as well as quality of contact with autistic individuals was correlated to higher levels of social distance preferences (Gillespie-Lynch et al, 2019).

Autism Stigma Knowledge

Many measurement tools have been developed over the years to collect information regarding various population's knowledge surrounding autism. These populations included parents of children with autism, professionals, as well as the general population. The most widely recognized tool is the autism knowledge survey (AKS; Harrison, Slane et al., 2017). This questionnaire includes a questionnaire in which the responder rates their agreement to various autism-related facts (Harrison, Slane et al., 2017). Created back in 1987, the AKS has been revised over the years to include new knowledge gathered from research conducted over the years. The latest revision in 2015 was changed to be congruent with the updated Diagnostic and Statistical Manual of Mental Disorders–5th edition (DSM-5; APA, 2013) definition of autism.

Though this questionnaire has widely been used to gather knowledge, there remains a lack of information regarding how well it can be adapted for cross-cultural use as well as a lack of psychometric data (Harrison, Slane et al., 2017). To address the lack of cross-cultural information, Harrison, Bradshaw, et al. (2017) conducted a quantitative study surveying autism knowledge among twenty-one different countries. These countries ranged from those who have reported greater knowledge regarding autism, such as the United States, Saudi Arabia, Pakistan,

and China, to countries that have reported lower knowledge of autism, such as Nigeria, Nepal, and Iraq. The purpose of the study was to identify groups of people or geographic areas that benefit from interventions that focus on specific domains of autism knowledge such as symptoms and treatment. The results of this study helped to develop the Autism Stigma and Knowledge Questionnaire (ASK-Q). This questionnaire is a 49-item instrument that includes yes/no questions regarding knowledge of stigma surrounding autism. The questions are broken down into four subscales: diagnosis, etiology, treatment, and stigma.

Yu et al. (2020) conducted a study to examine the effectiveness of the ASK-Q as a tool for cross-cultural assessment by comparing knowledge and stigma scores of American citizens to Chinese citizens. The results of the study found that approximately 90% of the American citizens received adequate knowledge in three of the four subdomains, compared to only 60% of Chinese citizens. When assessing the stigma subdomain, researchers found that only 14% of American citizens endorsed autistic stigma, whereas 40% of Chinese citizens endorsed stigma (Yu et al., 2020)

Stronach et al. (2019) conducted a study using the ASK-Q to examine autism knowledge and stigma among both university students and the general community. Of the four hundred fifty-six surveyed, one hundred fifty-three of them were university students from a larger midwestern university. When assessing the results of the four subscales, the researchers found that the participants demonstrated adequate knowledge for diagnosis (95.39%), etiology (94.77%), and treatment (93.72%) as well as not endorsing claims of stigma regarding autism (98.11%; Stronach et al., 2019).

The purpose of this study was to gather information regarding knowledge and stigma surrounding autism in a sample of university students. The specific research questions were:

1. What was the participants' overall knowledge of autism based on questions provided

via the Autism Stigma and Knowledge Questionnaire (ASK-Q)? How do these levels

compare to their levels of stigma?

2. Did the scores of the current study significantly differ from previously published data?

3. What percentage of participants answered each of the ASK-Q items correctly? Were

there particular questions that a high proportion of participants answered incorrectly?

Methods

Participants

The following study was approved by the University's Institutional Review Board. A

recruitment letter and survey was created and sent via email to various collegiate departments

and course instructors at a small Midwestern university of 6,000 students. The university is

located within a rural community but is within a thirty-minute distance from a large metropolitan

area. A total of 67 students were recruited to participate.

Twelve majors were represented in this study: elementary education, communication

sciences and disorders, social studies, health/physical education, English education, music

education, biology, mathematics education, health and human performance, school counseling,

and art education. Students that participated in this study included 13 freshmen (22%), 16

sophomores (27%), 10 juniors (17%), 14 seniors (23%), 4 fifth year students (7%), and 1

graduate student (2%). The student mean age was 21 years. Fifty-three (88.33%) participants

stated they knew someone who was diagnosed with autism. Table 1 summarizes demographic

information of participants.

Procedure

Survey responses were collected using Qualtrics online survey platform. Prior to the start of the survey, each participant was provided a consent page that detailed the purpose of the study. The participants were also asked demographic questions and to rate their understanding and knowledge regarding autism, ranging from "minimal knowledge" to "some knowledge" to "very knowledgeable". The participants were also asked to list where their knowledge about autism came from (i.e., personal experience, school, internet) as well as if they personally knew someone with autism [See Appendix A for full survey].

The participants were also given the Autism Stigma and Knowledge Questionnaire (ASK-Q; Harrison, Bradshaw, et al., 2017) which is a 49-item yes/no instrument broken down into four subscales: diagnosis, etiology, treatment, and stigma. Each response is scored as correct or incorrect. The four subscale scores are calculated as either inadequate or adequate: diagnosis (0–10 inadequate; 11–18 adequate), etiology (0–10 inadequate; 11–16 adequate), treatment (0–9 inadequate; 10–14 adequate), and stigma (0–2 endorsement of stigma; 3–7 does not endorse stigma; Harrison, Bradshaw, et al., 2017). The subscales not only demonstrated strong psychometric properties, but the ASK-Q had a high internal consistency (Cronbach's

Alpha=0.88; Harrison, Bradshaw, et al. 2017).

Table 1: *Demographic information*		
	n	Percentage (%)
Gender		
Female	52	86.7
Male	8	13.3
Race		
White	56	93.3
Asian	1	1.7
Multiracial	1	1.7
No response	2	3.2
Ethnicity		
Non-Hispanic	50	83.3
Hispanic	2	3.2
No response	8	1.7
Educational Level		
Freshman	13	21.7
Sophomore	16	26.7
Junior	10	16.7
Senior	14	23.3
5th Year	4	6.7
Graduate	1	1.7
No response	2	3.2
Age		
17-19	14	23.3
20-29	30	50
30-39	1	1.7
40-49	1	1.7
60-69	1	1.7
No response	2	3.2

Results

Level of Knowledge and Stigma

As part of the pre-questionnaire assessment, students were asked to select from a list of sources where their autism knowledge came from. This list included course work, articles, a medical professional, the internet, or personal experience. Majority of the participants (83%) stated they gained their knowledge through personal experience, with schoolwork (57%), internet (42%), and research articles (27%) being the subsequent sources.

Of the sixty-seven students recruited, sixty completed the entire survey. Analyzing the results of those responses revealed 100% of the participants demonstrated adequate knowledge

diagnosis with a mean score of 15.33 (SD=1.64, range 11-18); 100% of participants

demonstrated adequate knowledge of etiology with a mean score of 14.02 (SD=1.07, range 11-

16); 98.33% of participants demonstrated adequate knowledge of treatment with a mean score

12.70 (SD= 1.38, range 10-14); 100% of participants did not endorse stigma with a mean score

of 6.65 (SD=0.68. range 3-7).

Score Comparison

In a previously published study (Stronach et al., 2019), one hundred fifty-three students

were recruited from a large metropolitan Midwestern population. Analyzing the results of that

study revealed 97.39% of participants demonstrated adequate knowledge of diagnosis with a

mean score of 14.73 (SD= 1.71, range 11-18); 97.39% of participants demonstrated adequate

knowledge of etiology with a mean score of 13.82 (SD= 1.51, range of 11-16); 96.73% of

participants demonstrated adequate knowledge of treatment with a mean score of 12.54 (SD-

1.34, range 10-14); 99.35% of participants did not endorse stigma with a mean score of 6.42

(SD= 0.81, range 3-7).

Comparing the results of both studies, participants in the current study demonstrated an

overall higher percentage of adequate knowledge for all four subdomains; however, there were

no significant differences in the number of students who demonstrated adequate knowledge

across samples, $\chi^2 = 0.012$, $p = .999$.

Analyzing the pre-questionnaire, self-reporting autism knowledge, 53% of participants in

the current study stated they had some understanding of autism, compared to 70% from the

previous. In contrast, 40% of participants in the current study reported they were very familiar

with autism compared to only 15% in the previous study. When asked if participants knew

someone diagnosed with autism, 89% in the current study stated that they did know someone

compared to only 74% in the previous study.

Participant Accuracy

Breaking down the individual participant scores, the data revealed that the highest score

among participants was 98%. Participants scored between 40 and 47 (n=48, 93% overall). Within

each subdomain, participants answered with 100% accuracy on five diagnosis questions, three

etiology questions, one treatment question, and two stigma questions (see Table 3 for summary

of questions answered correctly). When analyzing the data for incorrect responses, only one

question had a high proportion of participants answering incorrectly. The participants were asked

whether they agreed or disagreed that there are currently no medical assessments used for

diagnosing autism. Seventy-seven percent of participants agreed that there are currently no

medical assessments used to diagnose autism.

Table 2: *Mean scores and percentages of participants with adequate knowledge, broken down by each subdomain on the autism stigma and knowledge questionnaire (Harrison et al., 2017) by sample group.*

ASK-Q Results	Current Study (n=60)		Previous Study (n=153)	
	Mean (SD)	*n (percentage)*	*Mean (SD)*	*n (percentage)*
diagnostic subdomain	15.33 (1.64)	60 (100)	14.73 (1.71)	149 (97.39)
etiology subdomain	14.02 (1.07)	60 (100)	13.82 (1.51)	149 (97.39)
treatment subdomain	12.70 (1.38)	59 (98.33)	12.54 (1.34)	148 (96.73)
stigma subdomain	6.65 (0.68)	60 (100)	6.42 (0.81)	152 (99.35)

Table 3: *Summary of questions answered with 100% accuracy (Harrison, Bradshaw, et.al, 2017)*	
Subdomain	
Diagnosis	-Many children with autism have trouble tolerating loud noises or certain types of touch. -Many children with autism show the need for routines and sameness. -Some children with autism show intense interest in parts of objects. -Many children with autism get upset if their routine is changed.
Etiology	-Autism affects people of all races and ethnicities. -Autism is a result of a curse or evil eye put upon/inflicted on the family. -Autism is due to cold, rejecting parents.
Treatment	-We now have treatments that can cure autism.
Stigma	-Autism is a result of a curse or evil eye put upon/inflicted on the family. -Autism is due to cold, rejecting parents.

Discussion

Participants in the current study demonstrated adequate knowledge by scoring within the range of adequate responses in all four subdomains. One hundred percent of participants received a score between eleven and eighteen for the diagnosis subdomain, between eleven and sixteen for the etiology subdomain, and between four and seven for the stigma subdomain. Ninety-eight percent of participants scored between ten and fourteen for the treatment subdomain. The previous study participants demonstrated adequate knowledge of each subdomain, with 97% of scoring within the adequate range for diagnosis, etiology, and treatment subdomains and 99% scored within the adequate range for the stigma subdomain.

Analyzing the separate subdomains, participants answered four out of eighteen diagnosis questions with 100% accuracy. These four statements covered stereotypical behaviors and characteristics, such as many children with autism need routines, have low tolerance for loud noises, and have strong interests in specific topics. These areas are the most commonly discussed topics when someone is first learning about autistic characteristics/behaviors.

Participants also answered three out of sixteen etiology questions, and two out of seven stigma questions with 100% accuracy. Two of the etiology questions were also considered

stigmatic statements due to either being an outdated thought or cultural superstition. Research

has shown that parenting styles do not determine if a child will be diagnosed with autism or not.

Within the subdomain of treatment, participants answered one out of fourteen possible questions

with 100% accuracy. This question stated there were treatments available to cure autism.

Currently, there is no known cure for autism.

Among all the questions asked, only one was consistently answered incorrectly.

Participants were asked if they agreed that there are currently no medical assessments used to

diagnosis autism. Only fourteen (23%) of participants answered this question correctly. A

potential rationale for the inaccuracy could be within the wording of the questions. Participants

could have misinterpreted "medical assessment" as a biological test (i.e. blood test), a genetic

test, or possibly a neurological assessment. Participants could have also been confused by the

wording, thinking that only a medical doctor diagnoses someone with autism. Currently, only

psychological and/or behavioral assessments are used to diagnose autism. Interestingly, in the

previous study, only 54 participants (35%) answered this question correctly.

Analyzing the pre-questionnaire information, majority of participants in the current study

stated that they knew someone with autism (89%) as well as gained their autism knowledge

through personal experience (83%). Though the higher reporting of personal experience with

autism, only 53% stated they were very familiar with autism. This higher level of personal

connection rather than coursework related knowledge could be another possible rationale as to

why the participants had higher levels of adequate knowledge overall.

April is national Autism Acceptance Month (AAM). Founded in 1970, the Autism

Society created awareness campaigns such as "National Autistic Child's Week" and later AAM

as a way to increases awareness and acceptance of individuals within the autistic community and

their families (Autism Society, 2021). The push for more acceptance and awareness of autism

within the general public could be a potential correlation as to why the results of both the current

study and the previous data demonstrated such high levels of adequate knowledge.

Strengths of the current study include use of a standardized measure to assess autism

knowledge that has been used in multiple previous studies (e.g., Harrison, Bradshaw, et al.,

2017; Stronach et al., 2019). Additionally, the inclusion of two different samples of university

students allowed for a better assessment of college student's knowledge of autism. The current

study had a fairly even distribution of students in their freshman, sophomore, junior, and senior

year of school. This could indicate that their knowledge could have come from a variety of

coursework.

This study had several limitations. Majority of participants (82%) identified they were

pursuing a degree within the human service profession field (i.e., education, therapy, and/or

counseling). Many of these students could have had exposure to autism knowledge from classes

prior to the study which could have given them a higher percentage of accuracy. This higher

percentage of human service professionals could have also skewed the true representation of

autism knowledge among college students at the university as a whole.

Another limitation was the small sample size. Of the 6,000 students attending the

university, only 60 students participated in the study. A potential causation for the lower number

of participants could be that this survey was conducted during the COVID-19 pandemic. This

prevented researchers from reaching out directly to students to participate in the survey.

Though the ASK-Q has been used as a standard measure to assess knowledge of autism,

but the questions used only tackle surface level knowledge and stigma. The questions do not ask

for more in depth understanding of autism or addresses more subtle stigmas associated with the

disorder. This surface level of question also led to a ceiling effect among the participants. The questions may have not been overly challenging to the participants, therefore increasing the likelihood of them scoring highly thus reducing overall variability among answers. Lastly, the ASK-Q does have the potential to be a useful tool for cross-cultural studies but it is limited in terms of using it to assess knowledge and stigma in college students in the United States (Yu et al., 2020).

Finally, the current study did not take advantage of providing educational material to participants post survey. Providing a handout with answers and explanations to the questions of the survey as well as providing resources could aid in increasing the participant's knowledge.

One area of the study that was not analyzed for this study was the pre-questionnaire statement asking participants to list the top three words that came to mind when he or she thought of the word "autism." This could be a good question to analyze in future studies because it could highlight potential preconceived notions a participant may have regarding autism based on the words he or she uses. For example, would those who affiliated autism with more positive words, such as "unique" or "focused", have a higher adequacy score compared to those who used more negative words, such as "different" or "difficult"?

Future studies should explore the inclusion of other assessment tools, such as the Autism Spectrum Disorders and Higher Education Questionnaire (White et al., 2019) or the Social Distance Scale (Gillespie-Lynch et al., 2015). These two tools ask more personal questions regarding relationships and interactions with someone autism. Using tools such as these could help gain more underlining stigmas a participant has towards someone with autism. Also, future studies should focus on recruiting more participants outside of the human service professional field, such as science or business students, in order to gather more information from individuals

who may not work directly with autistic individuals in their daily professional career, but may have autistic colleagues or family members.

Conclusion

Since the 1970's, advocates for autism have pushed for more acceptance and awareness among the general population to decrease overall stigma that has surrounded the disorder. College students entering the workforce, especially those in the human profession field, need to increase their knowledge of autism in order to be better equipped for interacting with autistic individuals. The current study showed positive signs of basic knowledge of autism amongst college students but there remains a need to continue to increase their overall knowledge of autism and reduced stigma. Future research should focus on continual promotion of education of the general population to enhance their understanding and acceptance of autism.

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Appendix A

UWRF ASK-Q

Study Title: IRB-FY2020-92 Autism Spectrum Disorder and Stigma Among College Students

Researcher Names/Department Contact Information:

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Communication Sciences and Disorders

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We are asking you to participate in our research study. Participation is voluntary and you may stop at any time, including skipping any questions you do not want to answer for any reason. If you choose not to participate or stop participating, or skip any questions, there will be no negative consequences to you. Participating will not change anything about your relationship with the researchers or our Departments

Overview of the Research

Purpose of the Study: This survey project explores the knowledge and stigma of autism amongst college students. **What you will be asked to do:** You will be asked questions in the specific areas of autism, educational level, personal connections to autism, personal thoughts regarding your knowledge of autism, and general demographic questions. **Amount of time it will take you to participate:** This survey should take 10-15 minutes to complete **Risks to you if you choose to participate:** Risks associated with confidential on-line surveys are minimal but include emotional responses to the questions or content area. **What we will do to reduce the risks:** You may skip any question or stop participating at any time. **Benefits to you or others if you choose to participate:** Your responses may be used to guide future research and potentially help improve undergraduate and graduate education in the area of autism.

Confidentiality and Data Protection

Who will see my answers/information? The information collected will be used for the stated purposes of this research project only and will not be provided to any other party for any other reason at any time except and only if required by law. **Where will my answers/ information be stored?** Your original survey will be stored on a password protected web platform for one year. Your de-identified responses will be stored in a file shared only by the investigators for up to seven years following the conclusion of data collection. **How will my answers /information be protected?** You should be aware that although the information you provide is confidential, it is transmitted in a non-secure manner. There is a remote chance that skilled, knowledgeable persons unaffiliated with this research project could track the information you provide to the IP address of the computer from which you send it. However, your personal identity cannot be determined. **Mandated Reporting Requirements:** We are mandated reporters and if we suspect

a child or vulnerable adult is being abused or neglected, we are required by law to report this information to local child protection or adult protection agencies or to the police.

Protection of Human Research Subjects

If I have questions about this research I should contact Sheri Stronach at sheri.stronach@uwrf.edu. **If I have questions or want to complain about my rights or how I was treated as a research participant I should contact** the Institutional Review Board Chair-University of Wisconsin River Falls410 S. Third St.-River Falls, WI 54022, 715-425-0629 irb@uwrf.edu

Please choose yes or no if you agree to participate in this survey. If you choose "Yes" you will be taken to the survey. If you choose "No", you will exit out of this survey. You may skip any question you do not want to answer by choosing "Prefer not to answer" or leaving your response blank. If you want to stop answering questions, please just close your web browser.

○ Yes (1)

○ No (2)

For each question, please choose the option that best matches your current beliefs and understanding about autism spectrum disorder (Agree/Disagree).

	Agree or Disagree	
	Agree (1)	Disagree (2)
1. I have heard of autism (1)	○	○
2. Some children with autism may lose acquired speech. (2)	○	○
3. Children with autism may have strange reactions to the way things smell, taste, look, feel, or sound. (3)	○	○
4. Many children with autism have trouble understanding facial expressions. (4)	○	○

5. We now have treatments that can cure autism. (5)   ◯   ◯

6. It is important that children diagnosed with autism receive some form of special education services at school. (6)   ◯   ◯

7. Some children with autism do not talk. (7)   ◯   ◯

8. Medication can alleviate the core symptoms of autism. (8)   ◯   ◯

9. There is currently no cure for autism. (9)   ◯   ◯

10. Autism happens mostly in middle class families. (10)   ◯   ◯

11. Autism is preventable. (11)   ◯   ◯

12. Many children with autism have trouble tolerating loud noises or certain types of touch. (12)   ◯   ◯

13. Autism is more frequently diagnosed in males than females. (13)   ◯   ◯

14. Children with autism can grow up to live independently. (14)   ◯   ◯

15. All children with autism usually have problems with aggression. (15)   ◯   ◯

16. Autism affects people of all races and ethnicities. (16)   ◯   ◯

17. Children with autism need extra help to learn. (17)   ◯   ◯

18. Children with autism are never too old to benefit from treatment. (18)   ◯   ◯

19. The earlier the treatment of autism starts, the more effective it tends to be. (19)   ◯   ◯

20. Children with autism do not enjoy the presence of others. (20)   ◯   ◯

21. Most children with autism are also intellectually disabled. (21)   ◯   ◯

22. Many children with autism show the need for routines and sameness. (22)   ◯   ◯

23. Vaccinations cause autism. (23)   ◯   ◯

24. Most children with autism are extremely impaired and cannot live independently as adults. (24)   ◯   ◯

25. Most children with autism may not look at things when you point at them. (25)   ◯   ◯

26. Some children with autism show intense interest in parts of objects. (26)   ◯   ◯

27. Autism is the result of a curse or evil eye put upon/inflicted on the family. (27)

    ○   ○

28. Many children with autism repeatedly spin objects or flap their arms. (28)

    ○   ○

29. Autism is a communication disorder. (29)

    ○   ○

30. Autism occurs more commonly among higher socioeconomic and educational levels. (30)

    ○   ○

31. Autism is a developmental disorder. (31)

    ○   ○

32. Behavior therapy is an intervention most likely to be effective for children with autism. (32)

    ○   ○

33. Early intervention can lead to significant gains in children with autism's social and communication skills. (33)

    ○   ○

34. Autism can be diagnosed as early as 18 months. (34)

    ○   ○

35. A lot of children with autism have problems with being aggressive or hyperactive. (35)

    ○   ○

36. Children with autism cannot learn any social skill. (36)

    ○   ○

37. Many times children with autism get excessively focused on one thing. (37)

○   ○

38. Many children with autism have difficulty using everyday language to communicate their needs. (38)

○   ○

39. Early intervention demonstrates no additional benefit to children with autism. (39)

○   ○

40. There is currently no medical test to diagnose autism. (40)

○   ○

41. Traumatic experiences very early in life can cause autism. (41)

○   ○

42. The number of diagnosed cases of autism has increased over the past 10 years. (42)

○   ○

43. Without proper treatment, most children diagnosed with autism eventually outgrow the disorder. (43)

○   ○

44. Autism is something that is very rare. (44)

○   ○

45. Autism is caused by God or a supreme being. (45)

○   ○

46. Autism is a brain-based disorder. (46)

○   ○

47. The cause of autism is not yet known for sure. (47)   ◯   ◯

48. Many children with autism get upset if their routine is changed. (48)   ◯   ◯

49. Autism is due to cold, rejecting parents. (49)   ◯   ◯

Please enter your age in years (or leave blank if prefer not to answer)

_____

What is your gender?

◯ Male (1)

◯ Female (2)

◯ Other (3)

◯ Prefer not to answer (4)

What is your racial background?

○ American Indian or Alaska Native (1)

○ Asian (2)

○ Black or African American (3)

○ Hawaiian or Other Pacific Islander (4)

○ White (5)

○ Multiracial (6)

○ Other (7)

○ Prefer not to answer (8)

What is your ethnicity?

○ Hispanic or Latino (1)

○ Non-Hispanic or Latino (2)

○ Prefer not to answer (3)

What is your year in school?

    ○ First year undergraduate (1)

    ○ Second year undergraduate (2)

    ○ Third year undergraduate (3)

    ○ Fourth year undergraduate (4)

    ○ Fifth year undergraduate (5)

    ○ First year graduate student (6)

    ○ Second year graduate student (7)

    ○ Other (8) _____

    ○ Prefer not to answer (9)

What is your major?

_____

How would you rate your understanding of autism?

    ○ Minimal/very little understanding (1)

    ○ Some understanding (2)

    ○ Very familiar with autism (3)

    ○ Prefer not to answer (4)

Where does your knowledge about autism come from? (Choose all that may apply)

☐ Personal experiences (1)

☐ Doctor or other medical professional (2)

☐ Learned about autism at school (3)

☐ TV shows/Movies (4)

☐ Internet (5)

☐ TV news stories (6)

☐ Social media (e.g., Facebook) (7)

☐ Research articles (8)

☐ Other (9) _____

☐ Prefer not to answer (10)

Do you know someone with autism?

○ Yes (1)

○ No (2)

○ Prefer not to answer (3)

If you do know someone with autism, what is their relation?

○ Self (1)

○ Family member (please indicate relationship) (2)

○ Friend (3)

○ Your friend's child (4)

○ Your friend's family member (5)

○ Colleague (6)

○ Your child's friend (7)

○ Other (8) _____

○ Prefer not to answer (9)

What are the first three words or phrases that come to your head when you think of autism?

○ 1 (1) _____

○ 2 (2) _____

○ 3 (3) _____

What is the earliest age that autism can be diagnosed?

	0	1	2	3	4	4	5	6	7
Years ()									