

Perception of Autism Spectrum Disorders Among Medical Students in Malaysia: Cross-Sectional Study

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Abstract

Autism Spectrum Disorder (ASD) often results in negative stigma and rejection, causing autistic individuals to be unjustly treated, resulting in them being socially isolated. Adults who have been diagnosed with ASD would be judged more negatively than childhood autism due to more empathy towards a child. This study is to explore the perception of Autism Spectrum Disorders among medical students in Manipal University College Malaysia (MUCM). An analytical cross-sectional study was conducted from May 2021 to June 2021 on undergraduate medical students of Manipal University College Malaysia (MUCM). The sampling method used was purposive sampling which the sample of our study was selected based on the characteristic of the population and objective of the study. A validated questionnaire was taken from a previous study and was distributed to the sample via electronic survey form. The students were asked to respond to the questionnaire by using a five-point Likert scale depending on the personal extent to which they agreed on the questions based on each scenario. The analysis included frequency, percentages, mean, standard deviation, 95% CI and p-value with the level of significance of 5%. Unpaired T-test, Paired T-test and ANOVA test were used in data analysis. The electronic questionnaire consisting of 49 questions was distributed to the medical students of Manipal University College Malaysia (MUCM). A total of 152 responses were received with a mean age of 21.65. The overall perception towards autism was 3.63 which showed a positive view of autism among medical students. This study revealed that exposure is a critical factor affecting the perception of medical students towards Autism Spectrum Disorder in Manipal University College Malaysia (MUCM). The present study is only an initial step to examine the perception. Future research may enlarge on this topic in several directions such as more in-depth studies are needed to have better identifying factors in influencing the perception and potential factors to reduce negative perception of autism for enhancement of better treatment services for individuals with autism which benefit both the future doctors and the patient.

Keywords

Autism, Autism Spectrum Disorder (ASD), Perception, Medical Student, Cross-sectional Study, Malaysia

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1. Introduction

Autism Spectrum Disorder (ASD) consists of several developmental disabilities which mainly affect an individual in social communication and interaction with others. [1, 2]

These social impairments often result in negative stigma and rejection, causing autistic individuals to be unjustly treated, resulting in them being socially isolated. [3, 4] Besides, individuals with autism may present with varying levels of intellectual disabilities, sensory anomalies, repetitive

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behaviours, difficulty in adapting to changes and they will be more attentive to details. [1, 5] Therefore, early diagnosis and treatment of ASD are important to reduce long term complications in autistic individuals such as special educational needs and the expensive medical cost and to bring positive changes to their behaviour and communication. [6]

In accordance with the World Health Organization (WHO), one in 270 of the worldwide population is believed to be diagnosed with ASD while the prevalence in low- and middle-income countries is unknown. [1] By comparing the first epidemiological study conducted in the year 1966, on children with autism in the United States, to the recent study in 2018, the prevalence rate has increased by approximately 55-fold from 4.5 per 10,000 children to 250 per 10,000 children (About 2.5% of the population in 2018). [7, 8] There was another study conducted by the Ministry of Health (MOH) Malaysia using the Modified Checklist for Autism in Toddlers (MCHAT), in which the prevalence of childhood autism in 2016 was reported to be approximately 1.6 in 1000 children at the age of 18 to 36 months old. [9] In 2017, the Centres for Disease Control and Prevention (CDC) carried out research in the United State and an estimated 2.21% of adults aged 18 years and older have Autism Spectrum Disorder. [10]

There are few factors contributing to perception towards ASD. One of the unexplored factors associated with perception towards ASD is gender-related behaviours towards autism. Besides that, racial disparity, nationality, education in terms of preclinical and clinical year, family history of autism spectrum disorders, parent's job related to autism spectrum disorders, previous interaction with autistic individuals and economic status also plays a role in perception towards ASD.

According to the previous studies, mixed findings have been observed when comparing both genders to the acceptance towards Autism Spectrum Disorder. Nevill and White found out that males were more open-minded and accepting compared to females towards autism. [11] However, some studies did not show any differences in the acceptance of ASD between both the genders [12], while Mahoney found that females were having a more positive attitude towards disabilities compared to males. [13]

Moreover, collectivist culture tends to implement a strong avoidance attitude and stigma towards individuals suffering from disabilities. [14] In many non-Western countries in Asia, this culture is widely practised mainly in Malay, Indian and Chinese communities that affect their acceptance of behavioural problems. [15] Henceforth, in a multicultural country such as Malaysia, it will be more interesting to

explore the impact of different cultures on the medical students' attitude towards ASD.

Exposure is described as any experience or the fact of being affected by something that may increase the awareness towards Autism Spectrum Disorder. [16] Medical students would have a clearer insight towards Autism Spectrum Disorder as they cross path with it during the clinical phase of their course. By then, they would be given the opportunity to reach out to patients with Autism Spectrum Disorder giving rise to their better perspective towards autism. [17] In a separate study conducted by Mahoney, it is shown that contact and exposure have improved the sociality between college students and autistic individuals. [16] Furthermore, individuals who have family members, relatives, or friends diagnosed with ASD showed a higher acceptance rate towards autism. [11]

In general, society judges women more harshly as compared to men. In the study conducted by Kayla Keats, adults who have been diagnosed with ASD would be judged more negatively than childhood autism if the individual was a female adult. However, there was no difference in perception when comparing a man to a child. [4] Besides, people tend to be more empathetic and often excuse the behaviour of children having disabilities, hence being more accepting of childhood autism. When it comes to peers of their age, they tend to judge more and compare their behaviour to themselves as healthy normal individuals. [11] This results in more social discrimination towards adults being diagnosed with Autism Spectrum Disorder.

In Malaysia, there were a couple of studies conducted on perception towards childhood autism [18, 19, 20] but there is a lack of data about the perception towards adult autism. Moreover, there is a short of study in Malaysia comparing the differences between opinions towards childhood and adult Autism Spectrum Disorder. Hence, this study is implemented to broaden the understanding of the community on how society perceives autism. In this study, we aimed to assess the perception of Autism Spectrum Disorders among medical students in Manipal University College Malaysia (MUCM). Secondly, it is intended to compare the differences in opinion of childhood and adult autism among medical students in MUCM. Lastly, it is done to study the factors affecting the perception of medical students towards Autism Spectrum Disorder.

2. Methodology

2.1. Study Design, Time, Setting and Study Place

An analytical cross-sectional study was conducted from May 2021 to June 2021 in our college. The participants of this

study are undergraduate medical students of a private medical college, Manipal University College Malaysia (MUCM) (formerly known as Melaka Manipal Medical College (MMMC)) which has two campuses mainly the Melaka campus, located in Melaka and Muar campus which is located in Johor, Malaysia. This college consists of students in MBBS, BDS, and FIS courses. In MBBS, there are a total of 10 semesters, where semesters 1 to 5 are conducted in the campus in India or Malaysia while the rest of the semesters are conducted here, in the Malaysia campuses. In our study, we included students from all 10 semesters of the MBBS program. This study aims to determine the perception of undergraduate medical students towards Autism Spectrum Disorders, and therefore a study population of 1300 medical students from MUCM was selected.

2.2. Sample Size

According to previous research that had been carried out on the medical students in Malaysia, they found that 84.3% of the first and final year medical students had a positive perception towards Autism Spectrum Disorder (ASD) [18], from which an estimated proportion of 0.843 was taken in our studies. The sample size was calculated using the Microsoft Excel Microsoft Sample Size Calculator with our population size (N) of an approximate total of medical students in MUCM, which is 1300. The study estimate is 84.3% and precision error is expected to be 6%. With this, we concluded our minimum sample size to be 133. Taking the non-response percentage of 10% into consideration n_{final} was calculated as follow:

$$n_{final} = \frac{n_{calculated}}{1 - non\ response\ \%} = \frac{133}{1 - 0.1}$$

148 was considered the final sample size (n) and they were chosen by using purposive sampling, a non-probability method of sampling.

2.3. Sampling Method

In this study, the sampling method used was a non-probability sampling method which is purposive sampling where the sample of our study was selected based on the characteristic of the population and objective of the study. Students of Manipal University College Malaysia (MUCM) who are currently studying in semester 6 and 7 of the MBBS program in the Muar campus and students in semester 8, 9 and 10 of the MBBS program in the Melaka campus as well as students currently in semester 1, 2, 3, 4, 5 of the MBBS program in either Melaka campus or India campus were selected to participate in this study.

The inclusion criteria were the medical students from

Manipal University College Malaysia, who are eligible and willingly consent to participate in the study and the questionnaires must be completed to be considered valid for the research after they filled up the consent form. Concurrently, the exclusion criteria are those who did not fill up the consent form, incomplete questionnaires, irrelevant responses and since participation was voluntary, those students who did not give consent were excluded including absentees.

2.4. Data Collection

An online questionnaire via google forms was used to collect data and consent was obtained. The questionnaire consisted of two parts. The first part consists of the participant's sociodemographic data including the participants' age, gender, semester, nationality, race, parent's occupation, household income and previous exposure to Autism Spectrum Disorder individuals.

The second part includes 3 scenarios, followed by a set of 12 questions for each scenario regarding medical students' perception towards autism, as well as comparing the differences in perception towards male adult autism, female adult autism, and childhood autism. The questionnaire was taken from a previous study. [4] The students were asked to respond to the questionnaire by using a five-point Likert scale - Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree; depending on the personal extent to which they agreed on the questions based on each scenario.

This study investigates the association between the independent and dependent variables. Independent variables of this study were age, gender, race, nationality, education (Preclinical vs Clinical year), family history of Autism Spectrum Disorder, parent's job related to Autism Spectrum Disorder, previous interaction with autistic individuals and economic status. Dependent variables were student's perception towards autistic individuals and perception towards child and adult autism. Data were collected via an electronic survey (online questionnaire), designed in English language, and consists of close-ended and multiple-choice questions. Survey items were formulated based on previously published articles. [4]

2.5. Data Processing and Data Analysis

Data collected was processed using Microsoft Excel. Data was then analysed statistically using Epi Info version 7.2.4.0 from the Centres for Disease Control and Prevention (CDC) website. For quantitative data (age of participants and perception), the range, mean along with standard deviation and median along with interquartile range were calculated. For qualitative data (gender, ethnicity, nationality, education (Preclinical vs Clinical year), family history of autism

spectrum disorders, parent's job related to Autism Spectrum Disorder, previous interaction with autistic individuals and economic status), frequency and percentage were calculated for each case scenario. The level of significance was set at 0.05

($p < 0.05$). The statistical tests used to find out the association between the independent variables and dependent variables (hypothesis testing) were shown in Tables 1 and 2 below.

Table 1. Independent and dependent variables with statistical tests.

Independent Variable	Dependent variable	Statistical Test
Age	Perception towards child and adult autism	Unpaired t-Test
Gender	Perception towards child and adult autism	Unpaired t-Test
Race	Perception towards child and adult autism	ANOVA
Religion	Perception towards child and adult autism	ANOVA
Nationality	Perception towards child and adult autism	Unpaired t-Test
Education (Preclinical vs Clinical year)	Perception towards child and adult autism	Unpaired t-Test
Parent's job related to autism spectrum disorders (Father)	Perception towards child and adult autism	Unpaired t-Test
Parent's job related to autism spectrum disorders (Mother)	Perception towards child and adult autism	Unpaired t-Test
Economic status	Perception towards child and adult autism	ANOVA
Previous interaction with autistic individuals (Paediatric posting)	Perception towards child and adult autism	Unpaired t-Test
Previous interaction with autistic individuals (Psychiatry posting)	Perception towards child and adult autism	Unpaired t-Test
Family history of autism spectrum disorders	Perception towards child and adult autism	Unpaired t-Test
Previous interaction with autistic individuals (Friends)	Perception towards child and adult autism	Unpaired t-Test

Table 2. Statistical test used for comparing perception between child and adult autism.

Variable	Variable	Statistical Test
Perception towards child autism	Perception towards adult autism	Paired t-test

2.6. Ethical Consideration

Participants of this study were obtained by voluntary participation. An informed consent form with all the important and relevant details of the study was given to the participants. At the same time, the participants were assured that the study was completely confidential. The participants'

information was kept confidential and used only for the purpose of this research. Their anonymity and privacy were well maintained. They were able to withdraw at any time without any reason. The research was conducted ethically with approval from the Research Ethics Committee, Faculty of Medicine of Manipal University College Malaysia, Malaysia.

3. Results

Table 3. Demographic variables.

Variable		Frequency (n)	Percentage (%)
Age (Years)	≤ 22	111	73.03
	> 22	41	26.97
Gender	Mean (SD)	21.65 (1.52)	
	Female	92	60.53
	Male	60	39.47
Race	Malay	7	4.61
	Chinese	57	37.50
	Indian	62	40.79
Religion	Others	26	17.11
	Buddhist	54	35.53
	Christian	25	16.45
	Hindu	53	34.87
	Islam	15	9.87
Nationality	Others	5	3.29
	Malaysian students	130	85.53
	International students	22	14.47
Education	Preclinical	74	48.68
	Clinical	78	51.32
Parent's occupation related to ASD	Yes	14	9.21
	No	138	90.79
Economic status	≤ RM 4849	28	18.42
	RM 4850 - RM 10959	78	51.32
	≥ RM 10960	46	30.26
Previous interaction with autistic individuals (Paediatric posting)	Yes	83	54.61
	No	69	45.39

Variable		Frequency (n)	Percentage (%)
Previous interaction with autistic individuals (Psychiatry posting)	Yes	84	55.26
	No	68	44.74
Family history of autism spectrum disorders	Yes	25	16.45
	No	127	83.55
Previous interaction with autistic individuals (Friends)	Yes	62	40.79
	No	90	59.21

An electronic questionnaire (google forms) consisting of 49 questions was distributed to the medical students of Manipal University College Malaysia and a total of 152 responses were received. Table 3 is displaying the sociodemographic characteristics (independent variables) of the participants in this study. Among the participants who responded, the majority were aged 22 years and below (n = 111, 73.03%) with a mean of 21.65 years (SD = 1.52). Additionally, most of the responses were noted to be females (n = 92, 60.53%), leaving a total of 60 responses (39.47%) to be that of males. Regarding race and religion, the highest response group came from the Indian community with 62 responses (40.79%) and Buddhist with 54 responses (35.53%). Since MUCM has international students, it was foremost to identify whether the nationality of the participants affects their perception of autism. Accordingly, a total of 130 participants were Malaysian (85.53%) while 22 participants were international students (14.47%). Besides, to study the impact of exposure to autism on the students' perception, we asked the students about their education and exposure to family or friends who have ASD. Medical students who have clinical exposure occupies 51.32% (n = 78) of the total sample. Amongst our participants, 83 (54.61%) have attended paediatrics posting and 84 (55.26%) have attended psychiatry posting.

Furthermore, 25 (16.45%) participants have a family history of Autism Spectrum Disorder (ASD) while 62 (40.79%) participants have come across individuals who have autism. Moreover, the occupations of parents of 9.21% (n = 14) participants are related to ASD, giving them extra benefit in exposure to autism. Mostly, our participants (n = 78, 51.32%) come from the household group of M40 with a monthly household income of RM 4850 to RM 10959.

Table 4. Perception towards ASD.

Variable	Mean (SD)
Perception towards adult male	3.60 (0.54)
Perception towards adult female	3.58 (0.60)
Perception towards child	3.70 (0.65)
Perception towards overall adult (Female & Male)	3.59 (0.55)
Total perception	3.63 (0.56)

Table 4 shows the perception towards Autism Spectrum Disorder (ASD) in adult male, adult female and child. The total average perception towards Autism Spectrum Disorder ASD is 3.63 with a standard deviation of 0.56. The highest mean is 3.70 (SD = 0.65) which is the perception towards child autism, while the lowest is perception towards adult female autism with the mean score of 3.58 (SD = 0.60). Lastly, the perception towards males with Autism Spectrum Disorder (ASD) is 3.60 (SD = 0.54).

Table 5. Factors associated with perception adult male.

Independent Variables	Knowledge Mean (SD)	Mean Difference (95% CI)	P - value
Age			
≤ 22	3.59 (0.55)	-0.07 (-0.27, 0.12)	0.474
> 22	3.66 (0.50)		
Gender			
Female	3.64 (0.58)	0.09 (-0.08, 0.27)	0.302
Male	3.55 (0.47)		
Race			
Malay	3.37 (0.50)	<0.001	
Indian	3.77 (0.53)		
Chinese	3.37 (0.43)		
Others	3.80 (0.58)		
Religion			
Buddhist	3.44 (0.51)	<0.001	
Christian	3.43 (0.48)		
Hindu	3.80 (0.53)		
Islam	3.59 (0.47)		
Others	4.23 (0.40)		
Nationality			
Malaysian student	3.59 (0.54)	0.11 (-0.13, 0.36)	0.368
International student	3.70 (0.56)		
Education			
Preclinical	3.57 (0.56)	0.06 (-0.11, 0.23)	0.485
Clinical	3.63 (0.52)		
Parent's occupation related to ASD			
Yes	3.63 (0.50)	-0.03 (-0.33, 0.27)	0.849

Independent Variables	Knowledge Mean (SD)	Mean Difference (95% CI)	P - value
No	3.60 (0.54)		
Economic status			
≤ RM 4849	3.62 (0.47)		0.750
RM 4850 - RM 10959	3.57 (0.56)		
≥ RM 10960	3.65 (0.54)		
Previous interaction with autistic individuals (Paediatric posting)			
Yes	3.62 (0.52)	-0.03 (-0.21, 0.14)	0.694
No	3.59 (0.57)		
Previous interaction with autistic individuals (Psychiatry posting)			
Yes	3.62 (0.52)	-0.04 (-0.21, 0.14)	0.662
No	3.58 (0.56)		
Family history of autism spectrum disorders			
Yes	3.68 (0.56)	-0.09 (-0.32, 0.15)	0.467
No	3.59 (0.54)		
Previous interaction with autistic individuals (Friends)			
Yes	3.73 (0.54)	-0.20 (-0.38, -0.03)	0.021
No	3.52 (0.52)		

*ANOVA and Unpaired T-test was used.

Table 5 shows the association between age, gender, race, religion, nationality, education, parent's occupation related to ASD, economic status, exposure towards autism and perception towards adult male diagnosed with autism. Females have a mean score of 3.64 (SD = 0.58), slightly higher than males with a mean score of 3.55 (SD = 0.47). The mean difference is 0.09 with a 95% CI range from -0.08 to 0.27. The p-value is 0.302 thus showing that there is no significant association between gender and the perception towards autistic adult males. In the race category, the p-value is <0.001 which shows a significant association between race and perception towards adult males with autism. The "Others" category in the race variable which consists of Sri

Lankan Sinhalese and Moors has the highest average score of perception towards adult males diagnosed with autism which is 3.80 (SD = 0.58). Amongst all the categories asked for participants' exposure to Autism Spectrum Disorder (ASD), previous interaction with autistic individuals (Friends) shows the highest average score of 3.73 out of five (SD = 0.54) towards adult male autism. The mean difference is -0.20 with 95% CI ranging from -0.38 to -0.03. The p-value is 0.021 showing that there is a significant association between previous interaction with autistic friends and perception towards adult males with ASD. With more exposure to autistic friends, the higher is the acceptance towards autism in adult males.

Table 6. Factors Associated with adult female perception.

Independent Variables	Knowledge Mean (SD)	Mean Difference (95% CI)	P - value
Age			
≤ 22	3.57 (0.60)	-0.03 (-0.25, 0.19)	0.779
> 22	3.60 (0.58)		
Gender			
Female	3.63 (0.62)	0.13 (-0.07, 0.32)	0.194
Male	3.50 (0.54)		
Race			
Malay	3.38 (0.60)	<0.001	
Indian	3.77 (0.59)		
Chinese	3.31 (0.47)		
Others	3.74 (0.65)		
Religion			
Buddhist	3.38 (0.54)	<0.001	
Christian	3.40 (0.54)		
Hindu	3.81 (0.59)		
Islam	3.50 (0.52)		
Others	4.32 (0.26)		
Nationality			
Malaysian student	3.57 (0.59)	0.06 (-0.21, 0.33)	0.673
International student	3.63 (0.63)		
Education			
Preclinical	3.60 (0.61)	-0.04 (-0.23, 0.15)	0.663
Clinical	3.55 (0.59)		
Parent's occupation related to ASD			
Yes	3.63 (0.58)	-0.06 (-0.39, 0.28)	0.744
No	3.57 (0.60)		
Economic status			0.902

Independent Variables	Knowledge Mean (SD)	Mean Difference (95% CI)	P - value
≤ RM 4849	3.53 (0.54)		
RM 4850 - RM 10959	3.58 (0.59)		
≥ RM 10960	3.60 (0.64)		
Previous interaction with autistic individuals (Paediatric posting)			
Yes	3.55 (0.58)	0.07 (-0.13, 0.26)	0.499
No	3.61 (0.62)		
Previous interaction with autistic individuals (Psychiatry posting)			
Yes	3.55 (0.58)	0.06 (-0.13, 0.26)	0.514
No	3.61 (0.62)		
Family history of autism spectrum disorders			
Yes	3.65 (0.65)	-0.09 (-0.35, 0.17)	0.494
No	3.56 (0.59)		
Previous interaction with autistic individuals (Friends)			
Yes	3.66 (0.64)	-0.15 (-0.34, 0.04)	0.133
No	3.51 (0.56)		

*ANOVA and Unpaired T-test was used.

Table 6 shows the association between MUCM medical students' age, gender, race, religion, nationality, education, parent's occupation related to ASD, economic status, exposure towards autism and perception towards adult female individuals with Autism Spectrum Disorder (ASD). By comparing both genders, female participants have a slightly higher mean score compared to male participants, which is 3.63 (SD = 0.62) compared to 3.50 (SD = 0.54). They have a mean difference of 0.13 with the 95% CI range of -0.07 to 0.32. The p-value is 0.194 which shows that there is no significant association between gender and perception towards adult female autism. In terms of race, Indian students have the highest mean score of 3.77 (SD = 0.59), followed by "Others" race students with a mean score of 3.74 (SD = 0.65), Malay students with a mean score of 3.38 (SD = 0.60), and lastly Chinese students with a mean score of 3.31 (SD = 0.47). The p-value is <0.001 thus showing that there is a

significant association between the students' race and their perception towards adult female autistic individuals. Medical students in MUCM who have been exposed to ASD in their Psychiatric posting have a mean score of 3.55 (SD = 0.58) while those who have not attended posting have a mean score of 3.61 (SD = 0.62). The mean difference is 0.06 with a 95% CI range of -0.13 to 0.26. The p-value is 0.514 hence showing that there is no significant association between exposure in Psychiatric posting and the students' perception towards adult female autistic individuals. In addition, participants who have friends diagnosed with ASD have a higher mean perception of 3.66 (SD = 0.64) compared to those who do not have friend exposure (Mean = 3.51, SD = 0.56). The mean difference is -0.15 with the 95% CI range of -0.34 to 0.04. The p-value is 0.133 which is not statistically significant.

Table 7. Factors associated with perception child.

Independent Variables	Knowledge Mean (SD)	Mean Difference (95% CI)	P - value
Age			
≤ 22	3.71 (0.65)	0.02 (-0.22, 0.25)	0.893
> 22	3.69 (0.63)		
Gender			
Female	3.82 (0.67)	0.31 (0.10, 0.52)	0.003
Male	3.51 (0.56)		
Race			
Malay	3.52 (0.65)		
Indian	3.94 (0.64)		<0.001
Chinese	3.42 (0.53)		
Others	3.80 (0.67)		
Religion			
Buddhist	3.42 (0.59)		
Christian	3.62 (0.53)		<0.001
Hindu	3.98 (0.64)		
Islam	3.71 (0.63)		
Others	4.10 (0.70)		
Nationality			
Malaysian student	3.69 (0.65)	0.07 (-0.23, 0.36)	0.656
International student	3.76 (0.64)		
Education			
Preclinical	3.66 (0.68)	0.08 (-0.13, 0.29)	0.438
Clinical	3.74 (0.61)		
Parent's occupation related to ASD		0.004 (-0.35, 0.36)	0.980

Independent Variables	Knowledge Mean (SD)	Mean Difference (95% CI)	P - value
Yes	3.70 (0.77)		
No	3.70 (0.63)		
Economic status			
≤ RM 4849	3.56 (0.56)		0.353
RM 4850 - RM 10959	3.70 (0.66)		
≥ RM 10960	3.79 (0.67)		
Previous interaction with autistic individuals (Paediatric posting)			
Yes	3.73 (0.61)	-0.06 (-0.26, 0.15)	0.598
No	3.67 (0.69)		
Previous interaction with autistic individuals (Psychiatry posting)			
Yes	3.72 (0.61)	-0.05 (-0.25, 0.16)	0.664
No	3.68 (0.69)		
Family history of autism spectrum disorders			
Yes	3.85 (0.67)	-0.18 (-0.46, 0.10)	0.206
No	3.67 (0.64)		
Previous interaction with autistic individuals (Friends)			
Yes	3.89 (0.62)	-0.32 (-0.52, -0.11)	0.003
No	3.57 (0.64)		

*ANOVA and Unpaired T-test was used.

Table 7 shows the association between age, gender, race, religion, nationality, education, parent’s occupation related to ASD, economic status, exposure towards autism and perception towards childhood autism. Female students have a mean score of 3.82 out of five (SD = 0.67), slightly higher than male students with a mean score of 3.51 (SD = 0.56). The mean difference is 0.31 with a 95% CI range from 0.10 to 0.52. The p-value is 0.003 thus showing that there is a significant association between the students’ gender and their perception towards autistic children. Indian continents have the highest acceptance towards childhood autism with a mean

score of 3.94 (SD = 0.65). The “Race” category has a p-value of <0.001 which shows a significant association between race and perception towards childhood autism. Medical students in MUCM who have had previous interactions with autistic individuals in their friend group have a mean score of 3.89 (SD = 0.62) while those who do not, have a mean score of 3.57 (SD = 0.64). The mean difference is -0.32 with a 95% CI range of -0.52 to 0.11. The p-value is 0.003, showing that there is a significant association between previous interaction with peers diagnosed with autism and their perception towards childhood autism.

Table 8. Comparing Perception towards adult and child.

Variables	Knowledge Mean (SD)	Mean Difference (95% CI)	P - value
Adult Male vs Adult Female			
Adult Male	3.60 (0.54)		0.196
Adult Female	3.58 (0.60)	0.03 (-0.02, 0.07)	
Adult Male vs Child			
Adult Male	3.60 (0.54)		0.002
Child	3.70 (0.65)	-0.10 (-0.16, -0.04)	
Adult Female vs Child			
Adult Female	3.58 (0.60)		<0.001
Child	3.70 (0.65)	-0.13 (-0.19, 0.06)	
Overall Adult vs Child			
Overall Adult	3.59 (0.55)		<0.001
Child	3.70 (0.65)	-0.11 (-0.17, -0.05)	

*Paired T-test was used.

Table 8 illustrates the comparison of the perception of participants towards child and adult autism. When comparing perception towards autism in adult males and adult females, the mean score of the adult male category is slightly higher with 3.60 (SD = 0.54) as compared to adult female category with 3.58 (SD = 0.60) and the p-value of this comparison is 0.196 which indicates no significant association of this comparison. Moreover, when comparing adult females and adult males against children respectively, the child has the

highest mean score of 3.70 (SD = 0.65). The p-value when a child is compared to an adult male is 0.002 and to adult female is <0.001 which are both statistically significant. Lastly, when the overall adult score is being compared with child, the mean score of the child is higher with 3.70 (SD = 0.65) as compared to the overall adult score with only 3.59 (SD = 0.55) and the p-value is the lowest among the four comparisons with <0.001 along with the comparison with the adult female category which indicates that these two

comparisons are the most significant.

4. Discussion & Conclusion

Our study was done to assess the perception of Autism Spectrum Disorders (ASD) among undergraduate medical students in Manipal University College Malaysia (MUCM). This cross-sectional study was also intended to compare the differences in opinion of childhood and adult autism among medical students. Besides, it was done to study the factors affecting the perception of medical students towards Autism Spectrum Disorder. According to our study, we found out that the overall perception of medical students towards autism is positive in all categories. Among the three categories of "Adult male", "Adult female" and "Child", the perception towards childhood autism is the highest which means medical students feel more empathy towards children compared to adults with disabilities. Based on the cross-sectional study done on college students by Nevill and White in a public university in the Southeast United States, children with disabilities tend to be more protected or taken care of. People would often excuse their behaviour, leading to a higher perception towards childhood autism when compared to adult autism. [11]

As for the comparison of the perception of medical students in MUCM towards adult and childhood autism, according to our study, there is no significant difference between the perception of the participants towards adult male and adult female autism. However, there is a significant difference between the perception of medical students towards adult male and child autism as well as adult female and child autism whereby their perception towards child autism is higher when compared to both adult male and female autism. The result is the same with overall adult and child whereby childhood autism has a higher positive perception compared to overall adult autism. It should be noted that our study results are slightly different as compared to the cross-sectional study conducted by Kayla Keats, which showed that adults who have been diagnosed with ASD would be judged more negatively than childhood autism if the individual was a female adult and that there was no difference in perception when comparing a man to a child. [4] According to the cross-sectional study conducted by Park and Chitiyo on teachers from a small town in the Midwest, majority of the participants had a positive attitude towards childhood autism. [21] Similarly, in another experimental study conducted on 88 adults consisting of freshman psychology students, people waiting for their family doctor in a waiting room and people who were leaving a furniture store, people had positive assessment towards children diagnosed with Autism Spectrum Disorder when they were

made aware of the child's condition. [22] Hence, supporting the result of our study in which children with autism have the highest positive perception among the medical students compared to adult male and female autism.

After comparing the factors affecting the perception of adult male autism, it is observed that race, religion, and exposure to autism in friend groups played a significant role in affecting the perception of medical students towards adult male autism. Among the race group, "Others" race which consist of Sri Lankan Sinhalese and Sri Lankan Moors have the highest perception mean score while Hindu has the highest positive perception among all religions. This is because they are taught to be more sympathetic and to show more care towards the sick and disabled. [23] Moreover, participants who have their peers diagnosed with autism were found to be having a more positive perception towards adult male autism when compared to those who do not have exposure to friends with autism. Contrarily, age and gender of participants, nationality, education, socioeconomic status, family history and exposure to Autism Spectrum Disorder (ASD) in terms of parent's occupation, paediatric posting and psychiatry posting do not have a significant association with perception towards adult males with autism.

For the perception of adult female autism, it was observed that only race and religion showed significant association with perception towards autism in adult females. Indian continent showed the highest perception towards autistic females and "Others" religion consisting of freethinkers and Sikhs have the highest perception score of 4.32 out of five. This may be due to freethinkers who have lesser religious barriers and thoughts such as bad karma and evil spirit hence being more open-minded towards disabilities. Future studies may conduct in-depth research on this aspect. Other variables like age, gender, nationality, education, socioeconomic status, family history and exposure to ASD have not been shown to have any significant influence on the perception of medical students towards females with ASD.

Lastly, the factors with significant association with perception on childhood autism are gender, race, religion, and exposure to autism among peers. By comparing both genders, females have a more positive perception towards autistic children when compared to males. For race and religion, the groups with the highest perception score are Indian and Hindu. Similarly, individuals who interacted with friends diagnosed with autism have a more positive perception towards childhood autism compared to those who do not have exposure to autism among their friend groups. Age, nationality, education, economic status, family history of ASD, parent's occupation and exposure to ASD in paediatric and psychiatric postings do not show any significant effect on participants' perception of childhood autism.

In our study, we found that females have a more positive perception towards autism when compared to males with a significant association between gender and childhood autism perception. This is supported by a cross-sectional study conducted by Mahoney on psychology students and a study by Payne involving undergraduate students in Florida State University, United States. [13, 16] In a similar study conducted by Gillespie and colleagues, females were shown to have less stigma towards autistic individuals. [24] On the other hand, Mathew has done a cross-sectional study on undergraduate students in the South-western United States which showed that male students were more open-minded towards autism. [25] This is also supported by Nevill and White, [11] as well as Griffin who did a study in the South-eastern state of the US involving middle school students. [26]

In Hong Kong, a study was conducted by Mark and Kwok involving Chinese parents of children diagnosed with Autism Spectrum Disorder. It implemented a strong avoidance attitude and stigma towards individuals suffering from disabilities. [14] In addition, Peters and Forlin found that the issue of “losing face” in the Chinese community has heavily influencing parents’ mindset that they prefer special schools for their child to avoid stigmatisation. [27] It is also mirrored in our study that the Chinese has the lowest overall perception score among other races towards autism.

Religion is a crucial aspect that affects one’s understanding of disabilities and how they treat the disabled. Most religions believe that disabilities occur due to the repercussion of karma done by an individual in their previous life. In our study, the religion that showed the most positive perception is “Others” which consist of Sikhs and freethinkers. This is contradicted in a literature review written by Kaur and Arora which discussed that Sikhs get disabilities as punishment due to their wrong desire in their current life while Hinduism believes that disability is perceived as a punishment from their past lives. [23] These thoughts may result in a more negative perception of individuals towards ASD. It is also mirrored in a previous study by Daal and Pande. [28]

On the other hand, freethinkers usually have their own beliefs especially about religious aspects, rather than accepting and blindly following what is taught. [29] So, they are free of all sorts of religious beliefs and thoughts such as djinn believed by Islam, karma in Buddhism and Hinduism, and wrong desires in Sikhism which prompt a more positive outlook towards autism. [23]

According to a cross-sectional study carried out by Petalas and colleagues involving siblings of individuals diagnosed with ASD in the United Kingdom, it showed a positive perception of the participants towards their siblings. [30] This is supported by Mascha and Boucher. They found out

that individuals with a family history of ASD expressed a positive attitude towards autism. [31] The study conducted by Nevill and White also showed that students with a diagnosed first-degree relative have a higher openness towards autism. [11] In our study, participants with family history showed to have a higher perception score than those who do not have exposure, but the association is not significant. Besides, Mahoney found that contact and exposure is a crucial factor in improving the sociality of college students and autistic individuals. [16] A cohort study was done by Devon White and colleagues among undergraduate students in the Northeast in the United States. This study showed that students who have contact or if they knew someone who has been diagnosed with autism, will have a more positive perception towards their peers with autism. [32]

There are some limitations in this study that could be addressed in future studies. This study was completed in a duration of 6 weeks which is a short duration to conduct a research study. The present study adopted a cross-sectional design, which only allowed us to observe participants at one point in time. Therefore, we were unable to observe the causal inference and the effect of time on the changes in participants’ knowledge and awareness, hence limited us from understanding perception among the variables. In addition, this study was only conducted in one private medical college whereby the results would be more representative and generalized to the population when we include various medical colleges in Malaysia. Furthermore, it is difficult to obtain responses from all the medical students of Manipal University College Malaysia (MUCM) due to the inability to distribute the questionnaire physically. Moreover, bias may be present in our sample as the study description states that the research is about perception towards ASD, hence individuals who had more positive acceptance may be selected as our participants. Other than that, we did not include other factors that may affect the perception of students towards autism such as knowledge about ASD, social media influence, ethical reasoning, moral values and upbringing of participants. We should also consider a wider range of age of participants as this might heavily influence their acceptance. Further studies in future should explore more in these aspects and add on a qualitative survey to broaden the understanding of researchers in the participants’ perception.

Nonetheless, with the above limitations, our findings should be viewed as preliminary but nevertheless could serve as a basis for hypotheses for further research that goes beyond an analogue study. Our study represents an initial test of the validity of the perception of medical students toward Autism Spectrum Disorder. This study was unique among existing studies as some students have extra exposure to clinical settings both in India and Malaysia which may affect their

perception when compared to those who have only been in Malaysia. [16, 17, 18] Besides, there were some studies comparing the perception of adult autism to childhood autism in Western countries but not in Malaysia. [4] So, this is a good opportunity to fill in the study gap in Malaysia.

In conclusion, findings of the present study revealed the perception towards Autism Spectrum Disorder among medical students not only in one aspect. We also studied the differences in perception between childhood and adult autism, as well as between males and females who have been diagnosed with ASD. This study revealed that exposure is a crucial factor affecting the perception of medical students towards Autism Spectrum Disorder in Manipal University College Malaysia (MUCM). The present study is only an initial step to examine the perception of students on a disability like autism. Future research may enhance more knowledge about this topic in several directions. First, more in-depth studies are required to have better identifying factors in influencing the perception of individuals with Autism Spectrum Disorder. Secondly, potential factors to reduce the negative perception of autism should be explored in future studies. Such research not only enhances our understanding of the reason behind the negative perception of autism but contributes to the enhancement of better treatment services for autistic individuals. It benefits both the future doctors and the patient in this kind of disability. Currently, the research on the perception towards Autism Spectrum Disorder or any similar studies is limited especially in medical colleges in Malaysia. We encourage similar studies to be done in medical colleges of other countries and compare them to those done in Malaysia. This serves to educate and create awareness amongst future doctors regarding the importance of having a positive perception toward individuals with Autism Spectrum Disorder.

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References

- [1] World Health Organization. Autism spectrum disorders. World Health Organization [Internet]. World Health Organization; 2 April 2021. Available from: <https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders>
- [2] Centers for Disease Control and Prevention. What is Autism Spectrum Disorder? Centers for Disease Control and Prevention [Internet]. Centers for Disease Control and Prevention; 25 March 2020. Available from: <https://www.cdc.gov/ncbddd/autism/facts.html>
- [3] Swaim KF, Morgan SB. Children's attitudes and behavioral intentions toward a peer with autistic behaviors: Does a brief educational intervention have an effect?. *Journal of autism and developmental disorders*. 2001 Apr; 31 (2): 195-205.
- [4] Keats KM. Factors influencing perceptions of individuals with autism (Doctoral dissertation, Memorial University of Newfoundland).
- [5] Interactive Autism Network (IAN). Interactive Autism Network (IAN) [Internet]. United State: Interactive Autism Network (IAN); 2013. Available from: <https://iancommunity.org/introduction-autism>
- [6] Koegel LK, Koegel RL, Ashbaugh K, Bradshaw J. The importance of early identification and intervention for children with or at risk for autism spectrum disorders. *International journal of speech-language pathology*. 2014 Feb 1; 16 (1): 50-6.
- [7] Lotter V. Epidemiology of autistic conditions in young children. *Social psychiatry*. 1966 Dec; 1 (3): 124-35.
- [8] Kogan MD, Vladutiu CJ, Schieve LA, Ghandour RM, Blumberg SJ, Zablotsky B, Perrin JM, Shattuck P, Kuhlthau KA, Harwood RL, Lu MC. The prevalence of parent-reported autism spectrum disorder among US children. *Pediatrics*. 2018 Dec 1; 142 (6).
- [9] Ramachandram S. Clinical characteristics and demographic profile of children with Autism Spectrum Disorder (ASD) at child development clinic (CDC), Penang Hospital, Malaysia. *Medical Journal of Malaysia*. 2019 Oct; 74 (5): 372-6.
- [10] Centers for Disease Control and Prevention. Key Findings: CDC Releases First Estimates of the Number of Adults Living with Autism Spectrum Disorder in the United States. Centers for Disease Control and Prevention [Internet]. Centers for Disease Control and Prevention; 27 April 2020. Available from: [https://www.cdc.gov/ncbddd/autism/features/adults-living-with-autism-spectrum-disorder.html#:~:text=An%20estimated%205%2C437%2C988%20\(2.21%25\),high%20of%202.42%25%20in%20Massachusetts](https://www.cdc.gov/ncbddd/autism/features/adults-living-with-autism-spectrum-disorder.html#:~:text=An%20estimated%205%2C437%2C988%20(2.21%25),high%20of%202.42%25%20in%20Massachusetts)
- [11] Nevill RE, White SW. College students' openness toward autism spectrum disorders: Improving peer acceptance. *Journal of autism and developmental disorders*. 2011 Dec; 41 (12): 1619-28.

- [12] Gardiner E, Iarocci G. Students with autism spectrum disorder in the university context: Peer acceptance predicts intention to volunteer. *Journal of autism and developmental disorders*. 2014 May 1; 44 (5): 1008-17.
- [13] Mahoney D. College students' attitudes toward individuals with autism. The University of North Carolina at Chapel Hill; 2007.
- [14] Mak WW, Kwok YT. Internalization of stigma for parents of children with autism spectrum disorder in Hong Kong. *Social science & medicine*. 2010 Jun 1; 70 (12): 2045-51.
- [15] Keshavarz S, Baharudin R. Perceived parenting style of fathers and adolescents' locus of control in a collectivist culture of Malaysia: The moderating role of fathers' education. *The Journal of genetic psychology*. 2013 May 1; 174 (3): 253-70.
- [16] Payne JL, Wood C. College students' perceptions of attributes associated with autism spectrum disorders. *Communication Disorders Quarterly*. 2016 Feb; 37 (2): 77-87.
- [17] Moyle JL, Iacono T, Liddell M. Knowledge and perceptions of newly graduated medical practitioners in Malaysia of their role in medical care of people with developmental disabilities. *Journal of Policy and Practice in Intellectual Disabilities*. 2010 Jun; 7 (2): 85-95.
- [18] Low HM, Zailan F. Medical students' perceptions, awareness, societal attitudes and knowledge of autism spectrum disorder: an exploratory study in Malaysia. *International Journal of Developmental Disabilities*. 2018 Mar 15; 64 (2): 86-95.
- [19] Majin M, Hashmi SI, Sombuling A. TEACHERS' KNOWLEDGE AND PERCEPTION TOWARDS CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD): A PRELIMINARY STUDY.
- [20] Low HM, Lee LW, Che Ahmad A. Pre-service teachers' attitude towards inclusive education for students with autism spectrum disorder in Malaysia. *International Journal of Inclusive Education*. 2018 Mar 4; 22 (3): 235-51.
- [21] Park M, Chitiyo M. An examination of teacher attitudes towards children with autism. *Journal of Research in Special Educational Needs*. 2011 Mar; 11 (1): 70-8.
- [22] Chambres P, Auxiette C, Vansingle C, Gil S. Adult attitudes toward behaviors of a six-year-old boy with autism. *Journal of autism and developmental disorders*. 2008 Aug 1; 38 (7): 1320-7.
- [23] Kaur S, Arora N. Religious Perceptions Towards Disability: A Changing Perspective.
- [24] Gillespie-Lynch K, Brooks PJ, Someki F, Obeid R, Shane-Simpson C, Kapp SK, Daou N, Smith DS. Changing college students' conceptions of autism: An online training to increase knowledge and decrease stigma. *Journal of autism and developmental disorders*. 2015 Aug; 45 (8): 2553-66.
- [25] Matthews NL, Ly AR, Goldberg WA. College students' perceptions of peers with autism spectrum disorder. 2015 Jan 1; 45 (1): 90-9.
- [26] Griffin WB. Peer perceptions of students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*. 2019 Sep; 34 (3): 183-92.
- [27] Peters B, Forlin C. Chinese children with ASD in Hong Kong (SAR): Development of inclusive practice. *Journal of Research in Special Educational Needs*. 2011 Jun; 11 (2): 87-98.
- [28] Dalal AK, Pande N. Cultural beliefs and family care of the children with disability. *Psychology and Developing Societies*. 1999 Mar; 11 (1): 55-75.
- [29] Cambridge Dictionary. Meaning of freethinker in English. Cambridge Dictionary [Internet]. Cambridge Dictionary; 15 June 2021. Available from: <https://dictionary.cambridge.org/dictionary/english/freethinker>
- [30] Petalas MA, Hastings RP, Nash S, Dowey A, Reilly D. "I like that he always shows who he is": The perceptions and experiences of siblings with a brother with autism spectrum disorder. *International Journal of Disability, Development and Education*. 2009 Nov 1; 56 (4): 381-99.
- [31] Mascha K, Boucher J. Preliminary investigation of a qualitative method of examining siblings' experiences of living with a child with ASD. *The British Journal of Development Disabilities*. 2006 Jan 1; 52 (102): 19-28.
- [32] White D, Hillier A, Frye A, Makrez E. College students' knowledge and attitudes towards students on the autism spectrum. *Journal of Autism and Developmental Disorders*. 2019 Jul; 49 (7): 2699-705.