
A STUDY OF KNOWLEDGE AND ATTITUDE TOWARDS AUTISM SPECTRUM DISORDER AMONG ADULT PATIENTS ATTENDING KLINIK KESIHATAN LUYANG

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Abstract: The prevalence of Autism Spectrum Disorder (ASD) has been on the rise in recent years. However, lack of ASD awareness can lead to delay in diagnosis and treatment as well as stigma towards autistic individuals. Therefore, it is paramount to assess the public's knowledge and attitude towards ASD. A cross-sectional study was conducted in Klinik Kesihatan Luyang from December 2018 to February 2019 using a self-administered questionnaire that comprised of 3 sections; sociodemographic section, Autism Stigma and Knowledge questionnaire (ASK-Q) and attitude towards ASD. There were 387 respondents who participated in this study and 25.3% of them had never heard of ASD. Among those who had heard of ASD, the mean (SD) score for ASK-Q was 35.0 (3.8) with more than 70% of them had adequate knowledge on diagnosis, aetiology and treatment of ASD. Majority of the respondents did not endorse stigma. The main sources of ASD information were from social media (69.8%) and TV/Radio (52.5%). Generally, respondents showed a high positive attitude towards ASD with a mean (SD) score of 36.0 (5.1). There were positive associations between knowledge on treatment and education level ($p=0.02$) and household monthly income ($p=0.01$) as well as knowledge on aetiology and household monthly income ($p=0.03$). Parenthood was associated with higher knowledge on aetiology ($p=0.02$) and lesser stigma endorsement ($p=0.02$). Males demonstrated more positive attitude compared to females ($p=0.03$). There was weak correlation between knowledge and attitude towards ASD ($r=0.145$, $p=0.014$). In conclusion, there is still a need for intervention to improve ASD awareness especially among the lower education and lower income population as well as those who had no parenthood experience, using effective channels of mass media.

Keywords: Autism Spectrum Disorder, Knowledge, Stigma

INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by persistent deficits in social interaction and social communication and typically, the affected individuals will have restricted and repetitive behaviour, interests and activities. (American Psychiatric Association, 2013). There had been a consistent rise in the prevalence of ASD over the past few years. A recent report published in April 2018 by the Centers for Disease Control and Prevention (CDC) in the United States of America showed that the prevalence of ASD in surveillance year 2014 was 1 in 59 or 1.7% for children above 8 years old with boys four times more likely to be affected than girls (Baio et al., 2018; Centers for Disease Control and Prevention, 2019).

While data were lacking for the exact prevalence of ASD in Asia in recent times, a few studies conducted over the last decade has shown that ASD was not as rare as we thought. In South East Asia, the reported prevalence in Indonesia was 11.7/10,000 and 6.94/10,000 in Bangkok (Elsabbagh et al., 2012). In Malaysia, the prevalence of ASD among our children in 2006 was reported as 16.0/10,000 (Ministry of Health Malaysia, 2014). Although the reason for the rise of prevalence is still unclear, it was partly attributed to the increased level of awareness on ASD among the public and the implementation of autism screening tools during routine child wellness visits (Bee, Kassim, Mohamed, & Mohamed, 2019; Rice et al., 2012).

Research focusing on the study of the public's awareness or knowledge about ASD is limited in South East Asia. There are limited local studies in this area and there is an urgent need to expand autism research in Malaysia as the public awareness level was low leading to unfair and undignified treatment to those suffering from ASD (Neik, Lee, Low, Chia, & Chua, 2014). This is supported by a study conducted among Malaysian public including mothers with autistic children that there was indeed a lack of awareness on ASD (Dolah, Yahaya, & Chong, 2011). Another recent local study conducted among the community residing in Mukim Dengkil, Sepang has further confirmed the lack of understanding regarding ASD as more than half of their respondents demonstrated poor knowledge on the matter (Mohamed Nur Adli K., 2017). This is alarming as lack of awareness or knowledge on ASD especially among parents and caregivers could lead to the delay in diagnosis and treatment of their autistic children

(Minhas et al., 2015). On the other hand, early intervention for autistic children has been proven to be beneficial with better long-term outcomes such as improvements in developmental trajectories and prevention of secondary symptoms like aggression and self-injury (Koegel, Koegel, Ashbaugh, & Bradshaw, 2014). Furthermore, better knowledge about ASD improves parental-child relationship and reduces psychological distress among parents and caregivers of autistic children (Gobrial, 2018). Studies have demonstrated that autistic people and their families suffer from stigma and discrimination more than physically disabled individuals (Neely-Barnes, Hall, Roberts, & Graff, 2011; Werner & Shulman, 2013). As high as 95% of autistic individuals and their caregivers experienced prejudicial attitudes and stigmatizing behaviours from the public (Lodder, Papadopoulos, & Randhawa, 2019). A study in France on knowledge, attitudes and behaviour towards mental disorders, namely Schizophrenia, Bipolar Disorder and Autism Spectrum Disorder, found that although attitudes towards ASD were less prejudicial compared to Bipolar Disorder and Schizophrenia, 61% respondents labelled afflicted individuals with inappropriate descriptions such as “mad” and “lunatic” and up to 7% of respondents thought that autistic people were dangerous (Durand-Zaleski, Scott, Rouillon, & Leboyer, 2012). Another study in Denmark showed that even though attitudes towards individuals with ASD were more positive compared to Schizophrenia, there was still a tendency for social distancing in more intimate relationships (Jensen et al., 2016). While attitudes have become more positive over time, there were still persisting discriminating attitudes, bullying and hate crimes committed towards these individuals. This sort of crippling mindset and attitude need to be corrected and eradicated and the rights of these individuals for social inclusion, independence and empowerment should be respected (World Health Organization, 2017).

In summary, a good awareness and knowledge level on ASD among the public is important as it can aid in the early diagnosis and prompt treatment, which will consequentially lead to improved well-being of autistic individuals and their families. It is also an essential component in efforts to eliminate stigma and prejudice against them as well as promoting their inclusion in the society. Thus, this study aimed to determine the level of knowledge and attitude towards ASD, identify the common sources of ASD information as well as the relationship between knowledge and attitude towards ASD among people in Sabah. This study is also aimed at

identifying factors associated with knowledge and attitude towards ASD. It is hoped that the information gained can assist health professionals in formulating a strategy to deliver fruitful interventions to improve awareness on ASD and thus improve the overall care and outcome of the autistic individuals.

METHODOLOGY

Study Design, Participation and Data Collection

This was a cross sectional study conducted among adult patients attending Klinik Kesihatan Luyang, Kota Kinabalu, Sabah. Data was collected from December 2018 to February 2019 and included Malaysian citizens of all ethnicities and aged 18 years old and above. Those who were critically ill or in an unstable condition, suffered from dementia, psychosis, intellectual disability or were visually impaired were excluded from recruitment. The minimum sample size required was 423 with a confidence interval of 95%, expected prevalence of 46% (Koyama et al., 2009), absolute precision of 5% and dropout rate of 10%. Using systematic sampling, every 35th person who registered at the counter were approached for recruitment. The first respondent of each day was selected via random number generator. If the approached person declined, then the next person in line was recruited. All respondents were briefed about this study and had given their written consent.

Study Instrument

The respondents were then requested to respond to a set of self-administered questionnaires. The questionnaires contained three sections that covered: (1) sociodemographic questions, (2) Autism Stigma and Knowledge questionnaire (ASK-Q) and (3) attitude towards ASD questionnaire. The ASK-Q had 49 items, the first item on ASK-Q assessed whether the respondents had heard of ASD before, 18 items assessed respondents' knowledge on the diagnosis of ASD, 16 items on the aetiology of ASD, 14 items on the treatment of ASD and 7 items assessed whether respondents endorsed stigma. Respondents had to choose 'Agree' or 'Disagree' to each of the items. Respondents were classified into "adequate knowledge" or "inadequate knowledge" in each diagnosis, aetiology and treatment domain and into "endorse stigma" or "do not endorse stigma" based on the scoring system proposed by the original author of ASK-Q (Harrison, Bradshaw, Naqvi, Paff, & Campbell, 2017) as shown in table 1.

Table 1: Recommended Subscores of ASK-Q

	Inadequate knowledge	Adequate knowledge
Diagnosis	0-10	11-18
Etiology	0-10	11-16
Treatment	0-9	10-14
	Endorse stigma	Do not endorse stigma
Stigma	0-2	3-7

Attitude towards ASD questionnaire was newly developed in English based on literature review and content expert opinions. It underwent content validity, face validity and pre-testing. The panel of experts who were involved for the content validity were a Family Medicine Specialist, two Paediatricians and two Psychiatrists. There were 5 positively worded items and 5 negatively worded items with a 5-point Likert scale of responses from strongly disagree (1) to strongly agree (5). The negatively worded items were reversed score. The expected score ranged from 10 to 50 and a higher score indicated a more positive attitude towards individuals with ASD.

Both the ASK-Q and attitude questions were translated into Malay language using the standard forward and backward translation using bilingual translators. Face validation of both English and Malay versions were carried out among ten adults who attended a primary care clinic in Universiti Kebangsaan Malaysia (UKM) and the questions were found to be appropriate and comprehensible. Pilot testing was then performed on 42 respondents in Klinik Kesihatan Luyang for both English and Malay versions of the questionnaire. The internal reliability, Cronbach alpha for Malay version of ASK-Q was 0.78 and this is comparable with the original ASK-Q of 0.88 (Harrison et al., 2017). The internal reliability, Cronbach alpha of the Malay version of the attitude questionnaire was 0.72 while the English version was 0.70.

Ethical Issues and Statistical Analysis

This study received approval from Medical Research and Ethics Committee (MREC) of Ministry of Health Malaysia (NMRR-18-1071-40527) and the Research Ethics Committee of Universiti Kebangsaan Malaysia (FF-2018-294). Permission was also obtained from the Kota Kinabalu District Health Office and the Family Medicine Specialist of Klinik Kesihatan Luyang. All respondents who took part in this study had given their written consent.

Data was entered into IBM SPSS Statistics version 25. Data was presented in frequency and percentage as well as mean (SD) or median (IQR) where appropriate. Pearson correlation was used to assess the correlation between the total ASK-Q score and the total attitude score. Chi square or student t-test were used to analyze the association between sociodemographic factors and each of the 4 domains of ASK-Q and attitude questions.

RESULTS

Profiles of Respondents

Table 2 summarizes the profiles of respondents. A total of 451 respondents were approached, and 387 agreed and completed the questionnaires making the response rate 85.8%. There was a high proportion of the respondents aged less than 40 years old, with a median (IQR) of 29.0 (15) years. Most of the respondents were female (72.9%), Bumiputra (68.7%), had an education up to tertiary level (58.4%) and an average monthly household income of less than RM 4000 (71.1%). More than half the respondents had children (58.4%). Among the respondents, 74.7% had heard of ASD while 43.3% of them knew someone with ASD.

Table 3 summarizes the profile of respondents who had never heard of ASD before. Mostly were younger than 40 years old (67.3%), females (64.3%), Bumiputras (57.1%), had education level up to secondary school (74.5%) with lower average household monthly income (84.7%).

Table 2: Sociodemographic Profiles of the Respondents (n = 387)

Variables	n	%
Age (years)		
18 to 39 years old	294	76.0%
40 years old and above	93	24.0%
Mean ± SD	33.0±12.5	
Median (IQR)	29 (15)	
Age range	18 to 76	
Gender		
Female	282	72.9%
Male	105	27.1%
Race		
Bumiputra	266	68.7%
Non Bumiputra	121	31.3%
Education level		
Up until secondary school	161	41.6%
Tertiary level	226	58.4%

Average household monthly income		
<RM4000	275	71.1%
>RM4000	112	28.9%
Parents		
Yes	161	58.4%
No	226	41.6%
Heard of ASD		
Yes	289	74.7%
No	98	25.3%
Know someone with ASD		
Yes	125	43.3%
No	164	56.7%

ASD= Autism Spectrum Disorder

Table 3: Sociodemographic Profiles of Respondents Who Never Heard of ASD (n = 98)

Variables	n	%
Age (years)		
18 to 39 years old	66	67.3%
40 years old and above	32	32.7%
Gender		
Female	63	64.3%
Male	35	
Race		
Bumiputra	56	57.1%
Non Bumiputra	42	42.9%
Education level		
Up until secondary school	73	74.5%
Tertiary level	25	25.5%
Average household monthly income		
<RM4000	83	84.7%
>RM4000	15	15.3%
Parents		
Yes	48	49.0%
No	50	51.0%

ASD= Autism Spectrum Disorder

Level of Knowledge on ASD and Source of ASD Information

From table 4, out of the 289 respondents who had heard of ASD, most of them had adequate knowledge on diagnosis (79.6%), aetiology (78.2%) and treatment (78.2%). The respondents showed high level of knowledge on ASD with total mean (SD) score of 35.0 (3.8). The majority of the

respondents did not endorse stigma towards individuals with ASD (94.5%).

Table 4: Respondents' Score on Each Domain of ASK-Q (n = 289)

	Range	Min	Max	Mean (SD)	Median (IQR)	Adequate Knowledge		Inadequate knowledge	
						n	%	n	%
Diagnosis score	0-18	3	12	12.4 (2.2)	13 (3)	230	79.6%	59	20.4%
Aetiology score	0-16	6	16	11.9 (1.8)	12 (2)	226	78.2%	63	21.8%
Treatmen t score	0-14	7	14	10.8 (1.6)	11 (2)	226	78.2%	63	21.8%
Stigma score	0-7	0	7	4.7 (1.4)	5 (2)	Do not endorse stigma		Endorse stigma	
						n	%	n	%
Total ASK-Q Score	0-48	25	44	35.0 (3.8)	35 (6)	273	94.5%	16	5.5%

ASK-Q= Autism Stigma and Knowledge Questionnaire

Appendix 1 shows the descriptive analysis of all the ASK-Q items. For diagnosis domain, majority of respondents correctly identified the core symptoms of ASD like abnormal sensory perception (95.5%), persistent preoccupation to certain objects (92.4%) and speech problem (88.2%). However, high proportion of them wrongly believed that all autistic children are aggressive (70.2%) and can be diagnosed using medical test (68.5%). Most of the respondents were accurate in answering questions pertaining to aetiology of ASD but almost half of the respondents also mistakenly thought that autism is preventable (46.7%) and that ASD is something that is very rare (41.9%). More than half of the respondents were also unaware that males are more commonly diagnosed with ASD than females (55.7%). Majority of them rightfully believed that children with autism need extra help to learn (99%), should receive special education services at schools (97.6%) and would benefit from early intervention to improve their social and communication skills (97.2%). However, about half of the respondents falsely thought that autism is curable (52.9%) and curative treatments are now available (47.8%). In the stigma domain, the majority of respondents accurately distinguished that autism is neither caused by a curse or evil eye (97.6%), God or a supreme being (85.8%) nor due to cold, rejecting parents (84.4%). On the other

hand, nearly half of them were of unfounded opinion that autistic children are extremely impaired and cannot live independently as adults (47.8%).

Figure 3.1 shows the respondents’ source of information regarding ASD. The main sources were social media (69.8%) and TV/Radio (52.5%). Only about a quarter of them had learned from healthcare providers (24.2%).

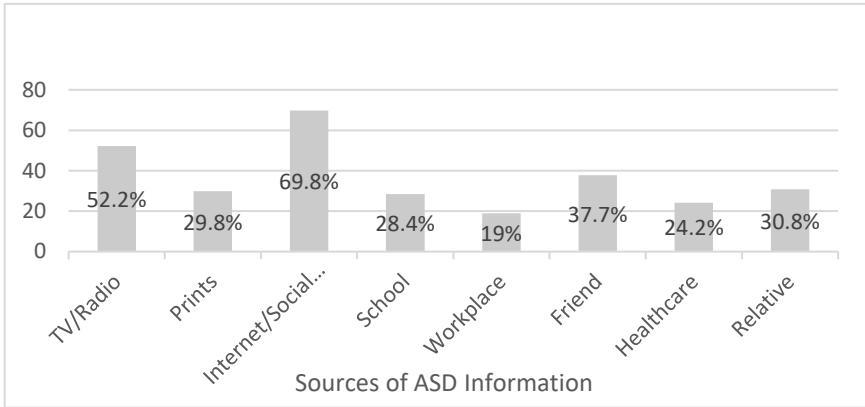


Figure 1: Sources of ASD Information (n=289)

Attitude Towards ASD

From table 5, respondents in general had a positive attitude towards ASD with the total mean (SD) score of 36 (5.1). High proportion of the respondents would not feel ashamed if their child was diagnosed with ASD (73%) and were comfortable in allowing their child play with autistic peers (62.3%). Most respondents agreed that autistic people should not be separated from society (95.9%) and were supportive of business corporation employing autistic individuals (80.9%). However, nearly half of them favoured segregation of pupils with ASD from typical children in school settings (42.6%).

Table 5: Respondents’ Attitude towards ASD (n = 289)

Statement	Agree		Neutral		Disagree	
	n	%	n	%	n	%
I would feel ashamed if my child is diagnosed with autism	14	4.9%	64	22.1%	211	73.0%

I am comfortable in letting my child play with an autistic child	180	62.3%	92	31.8%	17	5.9%
I am comfortable if an autistic child is placed in the same class as my child	136	47.1%	113	39.1%	40	13.8%
Children with autism should be placed in special schools separated from normal children	123	42.6%	85	29.4%	81	28.0%
I am comfortable if someone with autism moves in next door	127	43.9%	148	51.2%	14	4.9%
People with autism should be separated from society	5	1.7%	7	2.4%	277	95.9%
I am comfortable working with autistic people	111	38.4%	151	52.3%	27	9.3%
I am comfortable if someone with autism marries into my family	54	18.7%	180	62.3%	55	19.0%
I would not marry someone with autism	62	21.5%	153	52.9%	74	25.6%
If a supermarket near me announced a new policy of employing people with autism, I would be less likely to go there	15	5.2%	40	13.8%	234	81.0%
Total attitude score towards ASD	Range	Min	Max	Mean (SD)	Median (IQR)	
	0-50	22	50	36.0 (5.1)	36 (7)	

ASD= Autism Spectrum Disorder

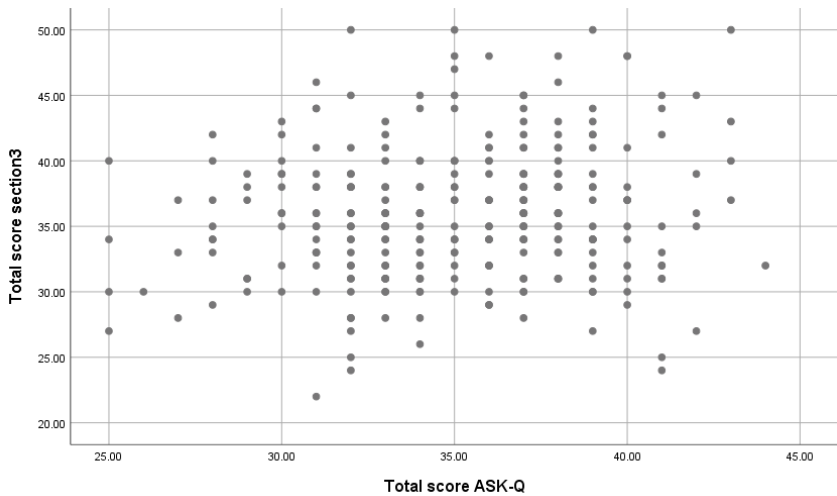


Figure 2: Correlation between Knowledge on ASD and Attitude towards ASD

Correlation between Knowledge on ASD and Attitude towards ASD

From figure 2, there is a poor correlation between knowledge on ASD score and attitude towards ASD score ($r = 0.145, p = 0.014$).

Association between Knowledge and Attitude towards ASD and Sociodemographic Factors

From table 6, there was an association between education level and knowledge on treatment of ASD (p -value = 0.02), average household monthly income and knowledge on aetiology of ASD (p -value = 0.03) and treatment of ASD (p -value = 0.01). There were also associations between being a parent and knowledge on aetiology of ASD (p -value = 0.02) and stigma (p -value = 0.02).

From table 7, the only significant variable was gender where male had a higher mean score on attitude towards ASD compared to females (p -value = 0.03).

Table 6: Association between Sociodemographic Factors and Knowledge on ASD (n = 289)

Variables	n	%	Diagnosis		Aetiology		Treatment		Stigma	
			X ²	p-value	X ²	p-value	X ²	p-value	X ²	p-value
Age (years)										
18 to 39 years old	228	21.1	0.31	0.58	3.42	0.06	0.64	0.42	2.25	0.24
40 years old and above	61	78.9								
Gender										
Female	70	24.4	0.85	0.36	1.55	0.21	0.01	0.93	3.52	0.12
Male	219	75.8								
Race										
Bumiputra	210	72.6	0.38	0.54	1.06	0.30	0.32	0.57	0.88	0.52
Non Bumiputra	79	27.4								
Education level										
Up until secondary school	88	30.4	1.64	0.20	3.24	0.07	5.86	0.02	0.40	0.73
Tertiary level	201	69.6								
Average household monthly income										
<RM4000	192	66.4	1.38	0.24	4.65	0.03	7.61	0.01	0.04	0.84

>RM4000	97	33.6								
Parents										
Yes	114	39.4	2.92	0.09	5.24	0.02	1.26	0.27	5.15	0.02
No	175	60.6								

Table 7: Association between Sociodemographic Factors and Attitude towards ASD (n = 289)

Variables	n	%	Attitude towards ASD score Mean (SD)	t-test	p-value
Age (years)					
18 to 39 years old	61	21.1	36.1 (5.2)	-0.63	0.53
40 years old and above	228	78.9	35.7 (4.9)		
Gender					
Female	70	24.2	37.2 (5.2)	2.16	0.03
Male	219	75.8	35.7 (5.1)		
Race					
Bumiputra	210	72.6	35.9 (5.1)	0.82	0.41
Non Bumiputra	79	27.4	36.4 (5.2)		
Education level					
Up until secondary school	88	30.4	35.7 (5.5)	0.70	0.49
Tertiary level	201	69.6	36.2 (5.0)		
Average household monthly income					
<RM4000	192	66.4	35.8 (5.0)	0.84	0.40
>RM4000	97	33.6	36.4 (5.4)		
Parents					
Yes	114	39.4	35.5 (5.2)	-1.42	0.16
No	175	60.6	36.4 (5.1)		

DISCUSSION

Level of Knowledge on ASD, Attitude towards ASD and Sources of ASD Information

This study is known to be the first that was conducted in Sabah aimed at assessing the level of knowledge and attitude towards Autism Spectrum Disorder among the urban population of Luyang area, a town which consists of multiple races and ethnicities that also includes the local natives unique to Sabah state.

Overall, respondents who had heard of ASD showed high level of knowledge on ASD with total mean (SD) score of 35.0 (3.8). More than 78% of said respondents displayed adequate knowledge in the domain of

diagnosis, aetiology and treatment of ASD, albeit lower than Minnesota's respondents where more than 90% of them demonstrated adequate knowledge on the ASK-Q (Stronach, Wiegand, & Mentz, 2019). This may be explained by the fact that a large majority of their respondents had high education background no less than an undergraduate degree. Extensive studies have shown that education, as a process or a product, has a causal relationship with health literacy and awareness and a higher education level predicts more favourable outcomes (Feinstein, 2006; Hahn & Truman, 2015). However, the authors of the mentioned study theorized that the high level of knowledge among the respondents detected in their study may also be due to the possibility of self-selection bias and the homogeneity of their sample (Stronach et al., 2019).

In contrast to another local study assessing the level of knowledge of ASD among the residents in Mukim Dengkil where only 47.7% of their respondents demonstrated good knowledge (Mohamed Nur Adli K., 2017), it can be argued that the differences in sample size, the diversity of the sampling population and the dissimilarity of the study site, played a role in the outcome disparity. Although respondents can properly identify most of the core symptoms of ASD, many of them believed that children with ASD are extremely impaired and often aggressive. This is in contrast to a study in France (Durand-Zaleski et al., 2012). Such misconceptions surrounding ASD are rampant in South East Asia and this must be rectified with urgency as the discrimination and social isolation of autistic children will deny them of their rights for education and services (Kinnear, Link, Ballan, & Fischbach, 2016; Lian, Ho, Yeo, & Ho, 2003; Lim, 2015; Riany, Cuskelly, & Meredith, 2016).

While most of the respondents rejected the debunked theories of vaccination and cold parenting methods as the cause of ASD, quite a number of the respondents believed that ASD is something rare, curable and preventable. This finding is similar to a study conducted in Japan where slightly more than half of their respondents had the same belief (Koyama et al., 2009). This will not only lead to the false hope that autistic children will grow out of their condition, it can also cause immense self-stigma and shame among parents and caregivers when they are blamed for the onset or deterioration of the child's condition by others (Papadopoulos, Lodder, Constantinou, & Randhawa, 2019). Thus, future intervention

efforts must be directed to refute these unproven allegations and myths regarding the prevalence and prognosis of ASD.

Generally, the respondents held positive attitudes towards autistic individuals with total mean (SD) score of 36.0 (5.1). However, areas that need improvement include their readiness for inclusiveness as some of the respondents preferred the segregation of autistic children from typical children in school settings and social distancing in more intimate relationships with autistic individuals. This attitude is quite similar as what was found in a study conducted in Denmark where the respondents' willingness for social interaction reduced substantially when it comes to more intimate relationships (Jensen et al., 2016). This indicates that there is hesitation among the public in forming close relationships with autistic individuals and it can be reasoned that it was because of the existence of negative stereotypes about them (de Vries et al., 2020; John, Knott, & Harvey, 2018). These stereotypes leading to social disengagement from the public need to be addressed as it can perpetrate harmful psychological issues among autistic individuals (Cage, Di Monaco, & Newell, 2018).

Approximately three quarters of the respondents had heard about ASD which is comparable with the people of Northern Ireland (Dillenburger, Jordan, McKerr, Devine, & Keenan, 2013). Respondents who had never heard about ASD before were mostly from the younger age group of less than 40 years old with lower education background and household income. The main sources of ASD information were from social media, television and radio broadcast followed by friends and relatives. Only about a quarter of respondents received the information from health professionals. These findings were similar to a study conducted in the United States of America and Canada (Mitchell & Locke, 2015). While health professionals are a trusted and reliable source of information, they are not an effective tool to spread awareness to the general public. On the other hand, social media had emerged as a powerful means of disseminating knowledge to the public in recent years while television had always been a traditionally popular method of spreading information (Boles, Adams, Gredler, & Manhas, 2014; Olowo, 2018). Therefore, efforts must be renewed to intensify the delivery of information about autism through the effective channels of mass media.

Relationship between Knowledge and Attitude towards ASD and Its Associated Factors

There was a poor correlation between knowledge and attitude towards ASD. This is contradictory to a study conducted in Australia which showed a high correlation between the two (Kuzminski et al., 2019). Possible reason to explain the poor correlation in this study is because knowledge does not always affect attitude per se, as attitude is also influenced by other factors such as the complexity of knowledge, global attitude, social identification and personal values (Boninger, Krosnick, & Berent, 1995; Fabrigar, Petty, Smith, & Crites, 2006).

Respondents who attained higher education levels and had a higher average monthly household income were found to have better knowledge on treatment or aetiology of ASD. This was consistent with findings in previous studies done in the United States of America (Holt & Christensen; Mitchell & Locke, 2015). This may suggest that college graduates received more accurate information about ASD either from their academic or professional settings. Similarly, respondents who had children were better informed regarding ASD especially in the aspect of aetiology and this may be due to the Malaysian healthcare system that mandates the M-Chat checklist to be conducted for every child as a screening tool for autism, therefore indirectly educating the parents regarding ASD. Parents were also less likely to endorse stigma as they are often more sympathetic and express more empathy towards children with disabilities (P. Albuquerque, G. Pinto, & Ferrari, 2019).

There were no significant associations found between sociodemographic factors and attitude towards ASD. The exception was that male gender demonstrated more positive attitude towards ASD as compared to their female counterparts, where similar results were also seen in previous researches among college students (Matthews, Ly, & Goldberg, 2015; Nevill & White, 2011). Studies on differences of emotional development between genders have shown that although male were less social and emotionally expressive, they were less fearful towards others (Brody, 1985).

Although this study possessed strengths by using a validated and reliable set of questionnaires and systematic random sampling method, there were a few limitations of this study. This study was conducted in an urban area

and the results may not reflect the rural or the whole of Sabah's population perspective. The ASK-Q did not have an 'unsure/don't know' option for respondents to choose and thus, we assumed that some of the respondents may have blindly picked an answer just for the sake of completing the questionnaire. The respondents of this study comprised mostly aged 40 years old and younger as it was quite difficult to get elderly respondents to participate due to literacy and language barriers. Lastly, as this was a self-reported questionnaire, social desirability bias should be considered.

CONCLUSION

In general, majority of the respondents who had heard of ASD showed adequate knowledge on ASD and possessed positive attitude towards autistic individuals. However, areas that required improvement include the public's generalized perception about autistic traits like aggressiveness and extreme disability, the false belief of the existence of a cure and its preventability, as well as the acceptance and inclusion of autistic individuals in all activities. Respondents who had higher education level, higher household monthly income and who were parents were associated with higher level of knowledge on ASD. Parents were also less likely to endorse stigma while male respondents demonstrated more positive attitude towards autistic people compared to their counterparts. In spite of that, about a quarter of the respondents had never heard of ASD.

Thus, intervention efforts to increase knowledge and promote awareness on ASD should be intensified and targeted at lower income and single, unmarried population through effective channels of communication such as social media, television and radio broadcast. In addition, awareness programs should be initiated early amongst students in secondary schools as a high proportion of the younger age group with educational attainment below tertiary level had never heard of ASD. Health education is a critical component of a health provider's job and the findings of this study will nonetheless aid in the deliverance and refinement of our awareness programs. Lastly, future research may consider to include multi-centre and rural settings which will result in a more accurate representation of Malaysian population.

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APPENDIX 1

Descriptive Analysis of Autism Stigma And Knowledge Questionnaire (ASK-Q) (n=289)

Statement	Correct		Incorrect	
	n	%	n	%
Some children with autism may lose acquired speech	121	41.9%	168	58.1%
Some children with autism may have strange reactions to the way things smell, taste, look, feel or sound	276	95.5%	13	4.5%
Many children with autism have trouble understanding facial expressions	222	76.8%	67	23.2%
We now have treatments that can cure autism	151	52.2%	138	47.8%
It is important that children diagnosed with autism receive some form of special education services at school	282	97.6%	7	2.4%
Some children with autism do not talk	192	66.4%	97	33.6%
Medication can alleviate the core symptoms of autism	149	51.6%	140	48.4%
There is currently no cure for autism	136	47.1%	153	52.9%

Autism happens mostly in middle class families	254	87.9%	35	12.1%
Autism is preventable	154	53.3%	135	46.7%
Many children with autism have trouble tolerating loud noises or certain types of touch	240	83.0%	49	17.0%
Autism is more frequently diagnosed in males than females	128	44.3%	161	55.7%
Children with autism can grow up to live independently	142	49.1%	147	50.9%
All children with autism usually have problems with aggression	86	29.8%	203	70.2%
Autism affects people of all races and ethnicities	279	96.5%	10	3.5%
Children with autism need extra help to learn	286	99.0%	3	1.0%
Children with autism are never too old to benefit from treatment	260	90.0%	29	10.0%
The earlier the treatment of autism starts, the more effective it tends to be	261	90.3%	28	9.7%
Children with autism do not enjoy the presence of others	172	59.5%	117	40.5%
Most children with autism are also intellectually disabled	128	55.7%	161	44.3%
Many children with autism show the need for routines and sameness	248	85.8%	41	14.2%
Vaccinations cause autism	265	91.7%	24	8.3%
Most children with autism are extremely impaired and cannot live independently as adults	151	52.2%	138	47.8%
Most children with autism may not look at things when you point at them	169	58.5%	120	41.5%
Some children with autism show intense interest in parts of objects	267	92.4%	22	7.6%
Autism is the result of a curse or evil eye put upon/ inflicted in the family	282	97.6%	7	2.4%
Many children with autism repeatedly spin objects or flap their arms	176	60.9%	113	39.1%
Autism is a communication disorder	120	41.5%	169	58.5%
Autism occurs more commonly among higher socioeconomic and educational levels	250	86.5%	39	13.5%

Autism is a developmental disorder	256	88.6%	33	11.4%
Behaviour therapy is an intervention most likely to be effective for children with autism	264	91.3%	25	8.7%
Early intervention can lead to significant gains in children with autism’s social and communication skills	281	97.2%	8	2.8%
Autism can be diagnosed as early as 18 months	205	70.9%	84	29.1%
A lot of children with autism have problems with being aggressive or hyperactive	250	86.5%	39	13.5%
Children with autism cannot learn any social skill	255	88.2%	34	11.8%
Many times children with autism get excessively focused on one thing	239	82.7%	50	17.3%
Many children with autism have difficulty using everyday language to communicate their needs	255	88.2%	34	11.8%
Early intervention demonstrates no additional benefit to children with autism	264	91.3%	25	8.7%
There is currently no medical test to diagnose autism	91	31.5%	198	68.5%
Traumatic experiences very early in life can cause autism	198	68.5%	91	31.5%
The number of diagnosed cases of autism has increased over the past 10 years	223	77.2%	66	23.8%
Without proper treatment, most children diagnosed with autism eventually outgrow the disorder	228	78.9%	61	21.1%
Autism is something that is very rare	168	58.1%	121	41.9%
Autism is caused by God or a supreme being	247	85.5%	42	14.5%
Autism is a brain-based disorder	193	66.8%	96	33.2%
The cause of autism is not yet known for sure	182	63.0%	107	37.0%
Many children with autism get upset if their routine is changed	239	82.7%	50	17.3%
Autism is due to cold, rejecting parents	244	84.4%	45	15.6%
