

# The School Environment is a Mixed blessing for Seventh-Graders with Autism Spectrum Disorder in Taiwan: A Cohort Study

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## Research Article

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# Abstract

**Background :** There is strong evidence to support the association between bullying and the onset of mental health conditions in students with ASD. In Taiwan, seventh grade marks the first year in middle school after elementary school. It is also a period when peers tend to affiliate with one another to perform bullying behaviors to establish status among the peer group. Therefore, it is considered one of the most challenging times for students with ASD due to several adjustments within the school environment and the developmental changes that arise at this age.. To assess the association between school environment and bullying victimization among students with autism spectrum disorder (ASD) studying in regular classes in the first year of middle school.

**Methods:** Data were obtained from the Special Needs Education Longitudinal Study database located in the Survey Research Data Archive of Academia Sinica. One hundred and eighty-four seventh-graders with ASD in regular classes across Taiwan were included in the analysis. The primary variables under study were whether they had experienced social exclusion, insults or teasing, extortion, or sexual harassment over the past semester.

**Results:** Participants with a higher positive friendship quality ( $P = 0.027$ ) and who had received more peer support upon encountering difficulties in school ( $P = 0.041$ ) were less likely to experience social exclusion. Participants with higher positive friendship quality ( $P = 0.001$ ) and a more positive learning environment in the classroom ( $P = 0.031$ ) were less likely to have experienced insults or teasing. However, participants with more friends were more likely to be extorted ( $P = 0.015$ ) and sexually harassed ( $P = 0.001$ ) than those with fewer friends. Furthermore, participants in regular classes on a part-time basis were 2.59 times more likely to report sexual harassment than those in regular classes on a full-time basis ( $P = 0.021$ ).

**Conclusions :** This study suggests that a supportive school environment reduces the likelihood that seventh-graders with ASD are bullied. Clinicians should consider the association between the school environment and bullying victimization among adolescents with ASD in regular classes during their first year of middle school.

## Introduction

Adolescents with special educational needs are more likely to be bullying victims than their classmates without such disabilities [1]. Individual with ASD has a considerably greater risk of being victimized than their peers without, a trend that applies from childhood to adulthood [2]. Studies have suggested that a combination of individual vulnerabilities in students with ASD, such as communication problems, stereotypical behaviors and interests, tendencies toward psychological distress, and aggressive behaviors, may lead to bullying victimization [3–8]. During adolescence, bullying victimization by schoolmates can result in multiple health problems, especially for individuals with autism spectrum disorder (ASD) [9, 10]. There is strong evidence to support the association between bullying and the onset

of mental health conditions such as panic disorder, major depression, loneliness, and social anxiety in students with ASD [5, 11, 12].

The social-ecological diathesis-stress model conceptualizes bullying as an interaction between the individual vulnerabilities (e.g., less social competence or fewer friends) of the victim and their environment [13, 14]. The association between bullying victimization and the school environment among typically developing children and adolescents comprises multiple factors, including parental engagement in school affairs, positive interpersonal interactions, peer social support, and the quality of friendships [15, 16]. The school environment has been associated with increased exposure to bullying among students with ASD [9, 17, 18]. However, whether protective measures against bullying in the school environment would be effective for Taiwanese students with ASD arranged in regular classes during the first year of middle school has yet to be determined.

In Taiwan, seventh grade marks the first year in middle school after elementary school. It is considered one of the most challenging times for students with ASD due to several adjustments within the school environment and the developmental changes that arise at this age. It is also a period when peers tend to affiliate with one another to perform bullying behaviors to establish status among the peer group [19]. Students with ASD have more significant social interactions and communication difficulties. Their maladaptive functioning exacerbates these difficulties when entering new social groups, particularly during the first year of the elementary-to-middle-school transition period [20]. Furthermore, the influence of environmental factors in schools on bullying victimization for seventh-graders with ASD has yet to be well examined [9, 17, 18, 21]. School administrations need to implement adequate measures to protect adolescents with ASD against bullying in their first year of middle school and reduce their risk of developing future mental health problems.

The present study investigates how the school environment is associated with bullying victimization among seventh-graders (aged 12–13 years) with ASD. Bullying victimization widely adopted in other studies [22, 23] was employed in this study. We examined four types of bullying victimization separately: social exclusion, insults or teasing, extortion, sexual harassment, and relationships with the school environment while controlling for individual variables. The following variables assessed the school environment: 1) the number of friends; 2) friendship quality; 3) classroom climate; 4) receiving assistance when difficulties occurred; 5) the teacher's attitude toward class integration; 6) parental engagement in children's learning, and 7) the amount of integration within regular classes. All analyses were controlled for the participants' sex, body mass index (BMI), learning capability, and levels of psychological distress.

## Methods

### Participants

**Study sample.** The study cohort sample was taken from the Special Needs Education Longitudinal Study (SNELS) database, which was released in 2011 from the Survey Research Data Archive of Academia

Sinica (<https://srda.sinica.edu.tw/index.php>). The Institutional Review Board has approved the data application and analysis. In the SNELS, representative samples of students with ASD were randomly selected from a list of registrants. Specifically, they were identified from medical records or records held by the Special Education Needs Committees of local governments, as described in a previous study [24]. In the SNELS, data were obtained from questionnaires administered online, which both students and teachers filled in. The students completed their questionnaires independently, with the teachers providing aid if necessary. Fig. 1 displays the process used for participant selection. Of the 317 seventh-graders with ASD involved in the SNELS study in 2011, 223 studied in regular classes in general education schools. Thirty-nine seventh-graders with ASD were excluded due to a lack of data regarding the studied variables. Overall, 184 seventh-graders (167 boys) with ASD were enrolled in this study.

## Types of Victimization

The students were asked whether they had experienced social exclusion, insults or teasing, extortion, or sexual harassment over the past semester. Social exclusion was assessed by asking the students, "Have you felt left out by your classmates at this school?" Being insulted or teased was measured by asking the students, "Have you felt insulted or teased by your classmates at this school?" Being extorted was assessed by asking the students, "Have you been extorted for money at this school?" Being sexually harassed was measured by asking the students, "Has anyone touched your body inappropriately and made you feel uncomfortable at this school?" Students recorded their responses using a four-point Likert scale (1 = *never*, 2 = *seldom*, 3 = *occasionally*, and 4 = *frequently*) to indicate the frequency of bullying victimization. Answers of "never" were coded as 0, and all other responses were coded as 1.

## Student Characteristics

Student characteristics comprised of the following variables: (a) sex, collected from teachers, with males and females coded 1 and 0, respectively; (b) BMI, collected from teacher reports, was calculated as weight in kilograms divided by the square of their height in meters; (c) the general tendency of the students' learning capability in school was collected from teacher reports. The variable of students' learning capability in school was assessed using the following ten items: 1) paying attention in class, 2) complying with instructions, 3) sitting still, 4) participating in classroom discussions, 5) having the initiative to ask questions, 6) answering teachers' questions, 7) focusing on schoolwork, 8) having the motivation to learn, 9) finishing homework on time, and 10) collaborating with peers to complete tasks. These items were scored on a four-point Likert scale (1 = *never*, 2 = *seldom*, 3 = *occasionally*, and 4 = *frequently*). Cronbach's  $\alpha$  for the ten criteria was 0.86. Psychological distress was self-reported using a six-item index adapted from the Symptom Checklist-90-Revised (SCL-6) instrument, originally developed to assess a broad range of psychological symptoms [25]. The criteria were extracted based on the most frequent symptoms experienced by students receiving special education services [26]. Each of the following six dimensions comprised one item of the SCL-6: depression (feeling downcast and lonely), obsessive compulsion (trouble concentrating), insomnia (restlessness or disturbed sleep), anxiety (feeling tense or uptight), psychoticism (never feeling close to another person), and anger/hostility (experiencing

the urge to break or smash objects or beat, injure, or harm others). The frequency of each item was rated on the same four-point scale used to assess the frequency of victimization incidents. Cronbach's  $\alpha$  for the SCL-6 was 0.88.

## School Environment Characteristics

Seven variables measured the characteristics of the school environment. First was the number of friends students had, which was assessed using responses to "How many classmates or friends do you usually hang out with?" on a scale of 1–5 (1: *no friends*, 2: *one friend*, 3: *two or three friends*, 4: *four or five friends*, and 5: *six or more friends*). The second, friendship quality, was measured by teachers' responses to the question, "Is the student able to get along well with other students in the class?" on a scale of 1–5 (1: *no interaction at all*, 2: *poorly*, 3: *not very well*, 4: *acceptably well*, and 5: *very well*). The third, classroom climate, was measured by teachers' responses to the following criteria: "The majority of the students proactively participate in inter-class competitions and activities," "The students have positive relationships with one another," "The students are helpful to and caring toward one another," and "The students collaborate (i.e., discuss their homework together)" using a scale of 1–4 (1: *not at all true*, 2: *not very true*, 3: *somewhat true*, and 4: *very true*). The fourth variable was whether students received assistance when difficulties occurred, which was measured by how students responded to the question, "Are you able to get help from anyone when encountering difficulties?" using a scale of 1–4 (1: *almost no one*, 2: *very few people*, 3: *some people*, and 4: *many people*). Variable five, the teacher's attitude toward class integration, was assessed by teachers' responses to the following phrases, "Schools should not exclude students with disabilities in student enrollment"; "Students with disabilities should be allowed to learn with their typically developing counterparts as much as possible"; "Regular class teachers should not neglect the needs of typically developing students in class because of the presence of students with disabilities"; "The placement of students with disabilities in the same class as that of typically developing students is beneficial for both types of students"; "The teacher's attitude is a key factor that affects the learning and adaptation of students with disabilities," and "Teaching students with disabilities is a responsibility shared by both special and regular class teachers" using a scale of 1–4 (1: *strongly disagree*, 2: *somewhat disagree*, 3: *somewhat agree*, and 4: *strongly agree*). The sixth variable, parental engagement in children's learning, was measured by teachers' responses to "How would you describe the involvement of this student's parents in their learning?" using a scale of 1–4 (1: *nonexistent*, 2: *not very high*, 3: *moderately high*, and 4: *very high*). The final variable, the amount of integration within regular classes, was measured by whether the students participate in classes full-time (coded as 0) or part-time (coded as 1). Those who were part-time in regular classes underwent special education sessions at other times.

## Data Analysis

All analyses were performed using the IBM SPSS Statistics program for Windows, version 22 (IBM Corp., Armonk, NY, USA). First, participant demographics and differences in the school environment between the participants who had not experienced bullying were analyzed. Continuous variables were analyzed using independent sample *t*-tests, and categorical variables were compared using the chi-square test. Next, four

separate hierarchical logistic regression analyses were conducted to examine the association between aspects in the school environment and the following types of bullying victimization: social exclusion, insults or teasing, extortion, and sexual harassment. Student characteristics were input into the models to assess their initial effects on bullying victimization. After adjusting for individual factors, the variables concerning aspects of the school environment were entered and analyzed.

## Results

### Sample Characteristics

Table 1 presents both the individual and school environmental aspects of the sample population. Among the 184 participants, 72.28% had experienced social exclusion, 70.11% had experienced insults or teasing, 6.52% had experienced extortion, and 28.26% had experienced sexual harassment. In contrast, only 14.13% had not experienced any bullying over the past semester. Overall, during the first year of middle school, approximately 85% had experienced at least one kind of bullying, and 66.85% had experienced at least two types.

Table 1  
Demographic Characteristics of the Study Sample (N = 184)

	<i>n</i>	%	Mean	SD
<b>Types of bullying victimization</b>				
Social exclusion	133	72.28		
Insults or teasing	129	70.11		
Extortion	12	6.52		
Sexual harassment	52	28.26		
<b>Number of types of bullying victimization experienced</b>				
Never	26	14.13		
One type	35	19.02		
Two types	81	44.02		
Three types	39	21.20		
Four types	3	1.63		
<b>Individual characteristics</b>				
Sex: male	167	90.76		
Sex: female	17	9.24		
BMI			21.64	4.27
Learning capability			2.04	0.57
Psychological distress			2.23	0.66
<b>School environment characteristics</b>				
Number of friends			2.69	1.30
Friendship quality			3.66	0.87
Classroom climate			2.40	0.45
Receiving assistance when difficulties occurred			2.79	0.82
Teachers' integration-related attitudes			2.40	0.55
Parental engagement			3.62	0.61
Integration: full-time	69	37.50		
Integration: part-time	115	62.50		

# Comparison of Those Who Had and Had Not Experienced Bullying Victimization

As Table 2 indicates, participants who experienced social exclusion had greater psychological distress ( $t(182) = 3.90, P < 0.001, d = 0.64$ ), fewer friends ( $t(182) = -2.80, P = 0.006, d = 0.46$ ), and lower positive friendship quality ( $t(134.37) = -3.81, P < 0.001, d = 0.63$ ) compared with those who did not. Moreover, their classroom environments were more negative ( $t(182) = -2.63, P = 0.009, d = 0.43$ ) and they received less assistance in school ( $t(182) = -3.88, P < 0.001, d = 0.64$ ). Participants who experienced insults or teasing reported greater psychological distress ( $t(182) = 3.34, P = 0.001, d = 0.54$ ) and lower positive friendship quality ( $t(160.53) = -4.24, P < 0.001, d = 0.68$ ) than those who had not. Furthermore, their classroom environments were more negative ( $t(182) = -3.49, P = 0.001, d = 0.56$ ) and they received less assistance when difficulties arose in school ( $t(182) = -2.47, P = 0.014, d = 0.40$ ). Teachers' attitudes were generally supportive toward class integration ( $t(182) = -2.55, P = 0.011, d = 0.41$ ). Compared with participants who had not experienced extortion, those who had experienced it reported having more friends ( $t(182) = 2.01, P = 0.046, d = 0.60$ ). The participants who had and had not experienced sexual harassment differed in terms of sex ratio ( $\chi^2(1) = 4.63, P = 0.044, d = 0.32$ ). Notably, participants who had experienced sexual harassment reported greater psychological distress than those who had not ( $t(182) = -2.30, P = 0.023, d = 0.38$ ).

Table 2  
Chi-Square and t-Test Results of Bullying Victimization by Individual and School Environmental Characteristics (N =184)

	Social exclusion			Insults or teasing		
	Experienced <sup>a</sup> ( <i>n</i> = 133)	None <sup>a</sup> ( <i>n</i> = 51)	<i>p</i> - value <sup>b</sup>	Experienced <sup>a</sup> ( <i>n</i> = 129)	None <sup>a</sup> ( <i>n</i> = 55)	<i>p</i> - value <sup>b</sup>
<b>Individual characteristics</b>						
Sex: male	123 (92.48)	44 (86.27)	.254	117 (90.70)	50 (90.91)	1.000
BMI	21.76 (4.17)	21.30 (4.52)	.505	21.72 (3.96)	21.48 (4.93)	.730
Learning capability	2.01 (0.57)	2.11 (0.58)	.293	2.02 (0.56)	2.09 (0.60)	.449
Psychological distress	2.34 (0.62)	1.94 (0.66)	<.001	2.33 (0.64)	1.99 (0.64)	.001
<b>School environment characteristics</b>						
Number of friends	2.53 (1.25)	3.12 (1.35)	.006	2.64 (1.31)	2.82 (1.31)	.386
Friendship quality	3.53 (0.92)	3.98 (0.62)	<.001	3.49 (0.92)	4.05 (0.56)	<.001
Class climate	2.34 (0.44)	2.53 (0.46)	.009	2.32 (0.43)	2.57 (0.47)	.001
Receiving assistance when difficulties occurred	2.65 (0.77)	3.16 (0.83)	<.001	2.70 (0.80)	3.02 (0.83)	.014
Teachers' integration-related attitudes	2.36 (0.55)	2.48 (0.53)	.196	2.33 (0.54)	2.55 (0.54)	.011
Parental engagement	3.59 (0.65)	3.71 (0.46)	.166	3.58 (0.65)	3.71 (0.50)	.149
Integration: full-time	46 (34.59)	23 (45.10)	.187	44 (34.11)	25 (45.45)	.146
Table 2 continued						
	Extortion			Sexual harassment		
	Experienced <sup>a</sup> ( <i>n</i> = 12)	None <sup>a</sup> ( <i>n</i> = 172)	<i>p</i> - value <sup>b</sup>	Experienced <sup>a</sup> ( <i>n</i> = 52)	None <sup>a</sup> ( <i>n</i> = 132)	<i>p</i> - value <sup>b</sup>

	Social exclusion			Insults or teasing		
<b>Individual characteristics</b>						
Sex: male	11 (91.67)	156 (90.70)	1.000	51 (98.08)	116 (87.88)	.044
BMI	21.73 (4.92)	21.64 (4.23)	.946	22.05 (3.89)	21.49 (4.41)	.425
Learning capability	1.93 (0.68)	2.05 (0.56)	.471	2.02 (0.55)	2.05 (0.58)	.799
Psychological distress	2.42 (0.98)	2.22 (0.63)	.315	2.34 (0.57)	2.19 (0.69)	.163
<b>School environment characteristics</b>						
Number of friends	3.42 (1.62)	2.64 (1.27)	.046	3.04 (1.47)	2.55 (1.21)	.023
Friendship quality	4.00 (0.60)	3.63 (0.88)	.069	3.58 (0.89)	3.69 (0.86)	.429
Class climate	2.52 (0.51)	2.39 (0.45)	.321	2.40 (0.47)	2.40 (0.45)	.945
Receiving assistance when difficulties occurred	3.00 (0.85)	2.78 (0.82)	.367	2.79 (0.85)	2.80 (0.81)	.958
Teachers' integration-related attitudes	2.50 (0.52)	2.39 (0.55)	.497	2.35 (0.62)	2.41 (0.52)	.503
Parental engagement	3.58 (0.52)	3.62 (0.61)	.831	3.58 (0.72)	3.64 (0.56)	.551
Integration: full time	3 (25.00)	66 (38.37)	.539	14 (26.92)	55 (41.67)	.090

## The School Environment Characteristics of Bullying Victimization

Table 3 presents the determinants of experiencing social exclusion, insults or teasing, extortion, and sexual harassment over the past semester (Models 1–4).

Table 3  
Final Hierarchical Logistic Regression of Bullying Victimization (N =184)

AORs [95%CI]	Social exclusion		Insults or teasing		Extortion		Sexual harassment	
<b>Individual characteristics</b>								
Sex: male <sup>Ref = female</sup>	1.47	[0.44, 4.90]	0.67	[0.19, 2.44]	1.02	[0.11, 9.40]	8.44*	[1.02, 69.91]
BMI	1.05	[0.96, 1.15]	1.01	[0.93, 1.11]	0.99	[0.84, 1.16]	1.02	[0.94, 1.11]
Learning capability	1.32	[0.62, 2.81]	1.54	[0.73, 3.26]	0.57	[0.17, 1.95]	1.15	[0.57, 2.29]
Psychological distress	2.66**	[1.37, 5.17]	2.59**	[1.35, 4.95]	2.24	[0.81, 6.15]	1.72	[0.98, 3.04]
<b>School environment characteristics</b>								
Number of friends	0.83	[0.61, 1.14]	1.06	[0.78, 1.44]	1.95*	[1.14, 3.35]	1.66**	[1.22, 2.25]
Friendship quality	0.55*	[0.32, 0.93]	0.40**	[0.24, 0.70]	1.55	[0.56, 4.27]	0.73	[0.46, 1.14]
Class climate	0.52	[0.22, 1.24]	0.39*	[0.17, 0.92]	2.58	[0.52, 12.65]	1.46	[0.65, 3.30]
Receiving assistance when difficulties occurred	0.57*	[0.33, 0.98]	0.87	[0.52, 1.44]	1.09	[0.47, 2.53]	0.90	[0.56, 1.44]
Teachers' integration-related attitudes	1.07	[0.53, 2.17]	0.69	[0.34, 1.41]	1.46	[0.40, 5.32]	1.03	[0.52, 2.03]
Parental engagement	0.81	[0.41, 1.59]	0.84	[0.43, 1.63]	0.78	[0.28, 2.18]	0.92	[0.52, 1.64]
Integration: part time <sup>Ref = full time</sup>	1.25	[0.55, 2.84]	1.71	[0.77, 3.83]	1.95	[0.40, 9.52]	2.59*	[1.16, 5.80]
-2 Log likelihood	177.63		182.76		87.33		194.95	
Omnibus tests	$\chi^2_{(7)} = 23.00, P = .002$		$\chi^2_{(7)} = 30.16, P < .001$		$\chi^2_{(7)} = 1.39, P = .846$		$\chi^2_{(7)} = 16.15, P = .024$	

## Social Exclusion

Participants who had higher positive friendship quality (adjusted odds ratio [AOR] = 0.55, 95% confidence interval [CI]: 0.32–0.93,  $P = 0.027$ ) or had received more assistance when encountering difficulties in school (AOR = 0.57, 95% CI: 0.33–0.98,  $P = 0.041$ ) were less likely to experience social exclusion.

Additionally, participants who reported having greater psychological distress experienced more social exclusion than those who did not (AOR = 2.66, 95% CI: 1.37–5.17,  $P = 0.004$ ).

## Insults or teasing

Participants who had higher positive friendship quality (AOR = 0.40, 95% CI: 0.23–0.70,  $P = 0.001$ ) or were in more positive learning environments in the classroom (AOR = 0.39, 95% CI: 0.17–0.92,  $P = 0.031$ ) were less likely to experience insults or teasing. Furthermore, participants who reported greater psychological distress experienced insults or teasing more often than those who had less or no distress (AOR = 2.59, 95% CI: 1.35–4.95,  $P = 0.004$ ).

## Extortion

Participants who reported having more friends (AOR = 1.95, 95% CI: 1.14–3.35,  $P = 0.015$ ) were more likely to have been extorted than those with fewer friends.

## Sexual Harassment

Participants who reported having more friends (AOR = 1.66, 95% CI: 1.22–2.25,  $P = 0.001$ ) were more likely to have been sexually harassed than those with fewer friends. Furthermore, students in regular classes on a part-time basis were 2.59 times more likely to report sexual harassment than those in regular classes on a full-time basis (AOR = 2.59, 95% CI: 1.16–5.80,  $P = 0.021$ ). Additionally, male students were 8.44 times more likely to report sexual harassment than female participants (AOR = 8.44, 95% CI: 1.02–69.92,  $P = 0.048$ ).

## Discussion

This study examined how students' characteristics and aspects of the school environment are associated with experiences of being bullied among adolescents with ASD in the first year of middle school. To the best of our knowledge, this is the first study to examine the possible association between bullying victimization and classroom environments using a sample of seventh-graders with ASD. The results revealed that seventh-graders with ASD who had higher-quality friendships or who received assistance when encountering difficulties in school had a lower risk of being socially excluded at school. Regarding insults or teasing, the school environment was shown to play an essential role alongside the positive impact of adolescents' friendships. Students with ASD who experienced high social cohesion, harmony, and mutual assistance in regular classes had a lower risk of being insulted or teased by classmates. This finding indicates that social acceptance by fellow students could reduce the risk of students with ASD being victimized and suggests that a positive classroom environment is an essential factor that protects against both social exclusion and insults or teasing.

Hebron and Humphrey (2014) found that positive peer relationships are associated with lower bullying victimization levels. They argued that positive peer relationships could provide a friendly environment for learning social skills and are essential for protection against victimization [17]. The current findings are consistent with those from the studies of typically developing adolescents, which suggest that peer

victimization is less likely to occur in a classroom environment comprised of positive, warm, and supportive peer relationships [27, 28]. Thus, efforts to reduce bullying should emphasize empathy among students in regular class settings.

Positive friendship quality, receiving social aid while at school, and a positive learning environment in the classroom all decrease the risk of being bullied. Typically developing students with higher-quality friendships are likely more likely to accept social support and connectedness and embrace diversity at school. These are the core elements of social capital [29]. Building social capital, a sense of community, and positive interpersonal and intergroup relationships at school are essential for preventing bullying [30]. Additionally, a friendly and supportive school environment that guides students with an unconditionally positive attitude also enhances social capital by promoting the belief that people are trustworthy, fair in their actions, and helpful when needed [31]. Regardless of whether anti-bullying efforts only focus on a single type of bullying, building social capital at schools is essential to developing social-ecological interventions to prevent the bullying of adolescents with ASD.

However, participants with more friends were more likely to be extorted or sexually harassed than those with fewer friends. This result contrasts with previous studies that found that students with ASD who had fewer friends at school were more likely to be victimized [3, 18]. This suggests that having friends does not necessarily guarantee protection and support as some friends could be aggressive and abusive. Studies have indicated that a substantial proportion of bullying events occur within the boundaries of perceived friendships [32, 33]. Additionally, regarding sexual harassment, a discrepancy often exists between the offenders' and victims' interpretations of behavioral intention. Rather than the aggressor's intent, the victim's perception may be more critical in identifying whether victimization has occurred. Finally, when individual characteristics were controlled for (i.e., sex, BMI, learning capability, and psychological distress), participants who were part-time in regular classes were more likely to be victims of sexual harassment than those who were full-time in regular classes. However, in general, the association between the amount of integration in regular classes and the sexual harassment of students with ASD is unclear and warrants further investigation.

Regarding the individual characteristics related to vulnerability, participants with more significant psychological distress were more likely to experience social exclusion and insults or teasing than those with lower levels of psychological distress. Previous studies have shown that depression, anxiety, and stress are significantly associated with bullying victimization among adolescents. The elevated levels of psychological distress resulting from these conditions constitute risk factors for bullying victimization [34–36]. In this study, male participants were more likely to have experienced sexual harassment than female participants. However, of the current sample of 184 students, only 17 were female. Therefore, there may not have been sufficient data to properly analyze the actual differences in experience between boys and girls. Future studies should compare the risk of sexual contact victimization among male and female adolescents with ASD and delineate the mechanisms that underlie any sex differences.

In conclusion, the longitudinal/accumulated effects of bullying on adolescents with ASD seen during the first year of middle school represent pressing issues. However, the present study only examines the association between bullying victimization and social exclusion, insults or teasing, extortion, and sexual harassment in the school environment. This focus leaves the field open for future studies regarding the potential association between other types of bullying and the school environment and bullying studies outside schools / in special education classes [13].

## Limitations

Instead of self-reporting bullying victimization, there is a significant essential need to use multiple informants, including parents and teachers [37, 38]. In Taiwan, middle-school homeroom teachers do not typically remain in the classroom throughout the day, thus preventing said teachers from observing student interactions. Furthermore, adolescent students tend to be reluctant to tell their parents about their experiences in school. Again, as previously mentioned, the victim's perception, rather than the aggressor's intent, may be more crucial in identifying victimization. Therefore, the self-reported experiences of bullying victimization in this study are considered valid. However, bias or faulty awareness was likely present within these self-reports of interpersonal interactions. Future research on this population should further identify student-reporting bias and collect data from multiple informants.

## Conclusions

Within this study cohort, approximately 85% of the seventh-graders with ASD had experienced at least one type of bullying. The data suggest that students with ASD are likely to become victims of bullying while adapting to new schools and during the period when peers form affiliations and adopt bullying behaviors to establish status. These results highlight the need for intervention and proactive prevention strategies against bullying to help students with ASD studying in regular classes during the first year of middle school. Moreover, the type of school environment strongly contributed to the risks of being victimized, depending on bullying. Unexpectedly, adolescents with ASD studying in a regular class setting had an elevated risk of bullying victimization. This finding underlines the complex mechanisms of bullying victimization in school environments.

Social support, positive friendships, and a positive learning environment were indicated among students as protective factors against bullying victimization. This finding can serve as reference data for the development of future anti-bullying programs designed for school settings. More programs that focus on inclusion and diversity are needed to aid adolescents with ASD who participate in regular class settings to prevent their likelihood of suffering from bullying. Positive school environments have been shown to help reduce the frequency of bullying behaviors [39, 40]. Implementing more steps toward this goal is expected to facilitate the successful integration of students with ASD into regular class settings.

## Abbreviations

ASD

*autism spectrum disorder*

SCL-6

*Symptom Checklist-90-Revised*

SNELS

*Special Needs Education Longitudinal Study*

## Declarations

**Authors' contributions:** HH applied the database; HH and DR designed the analysis and analysed the results; HH, DR and AK wrote the manuscript and contributed to editing the manuscript. All authors read and approved the final manuscript.

**Ethics approval and consent to participate:** The informed consent was provided by all respondent.

**Availability of data and materials:** The data that support the findings of this study are available in the Special Needs Education Longitudinal Study (SNELS) database, released from the Survey Research Data Archive of Academia Sinica but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of the Survey Research Data Archive of Academia Sinica.

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**Consent for publication: Not applicable**

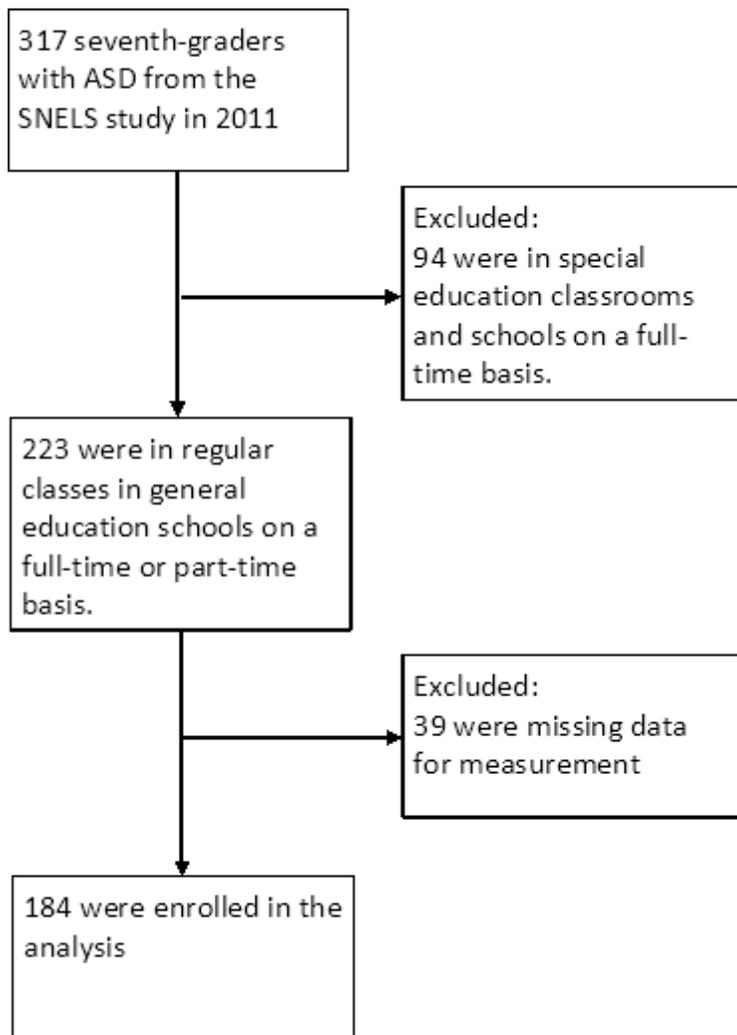
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## Figures



**Figure 1**

Flow chart of the selection process of study participants.