

Peer Victimization and Educational Outcomes in Mainstreamed Adolescents with Autism Spectrum Disorder (ASD)

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Abstract The majority of adolescents with ASD spend a significant amount of the school day in general education settings; yet, many of these students exhibit problems at school. The current manuscript examined whether specific types of peer victimization were associated with a range of educational outcomes. Participants from study 1 included parents of 1221 adolescents from the Interactive Autism Network. Study 2 included 54 adolescent males and one of their parents that were recruited from a clinic registry. Both studies found that all types of victimization were associated with educational outcomes. These findings indicate that, in addition to improving overall well-being of students with ASD, reducing peer victimization could have positive effects on educational performance of these students.

Keywords Victimization · ASD · School · Bullying

The original version of this article was revised: In the original publication, the asterisks (***) were incorrectly added in the body of the Tables 2, 3 and 4. The single, double and triple asterisks were inadvertently replaced with triple asterisks during the production process. This has been corrected in this version.

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Introduction

More than half of students with autism spectrum disorder (ASD) spend a significant amount of the school day in a general education classroom setting, with the largest and fastest growing group of individuals with ASD being those spending more than 80 % of their time in this setting (Snyder and Dillow 2015). As inclusion (i.e., “mainstreaming”) of adolescents with ASD becomes increasingly common, there is a pressing need to understand more about their educational outcomes in general education settings. Of particular concern is that the academic achievement of many students with ASD is lower than would be expected based on their IQ (Ashburner et al. 2010; Estes et al. 2011; Jones et al. 2009; Keen et al. 2015; Wei et al. 2013). Students with ASD are also less likely to enjoy school or be cooperative at school compared to typically developing (TD) classmates (Jahromi et al. 2013).

One probable contributor to poor educational outcomes for mainstreamed adolescents with ASD is problems with social functioning, which have been repeatedly implicated in studies of educational performance in TD adolescents. Many studies in TD samples have shown that peer victimization predicts academic achievement, school engagement, and dropping out (Cornell et al. 2013; Juvonen et al. 2011; Nishina et al. 2005); this is especially concerning for adolescents with ASD given the extremely high rates (between 40 and 94 %) of peer victimization reported for this group (Cappadocia et al. 2012; Sterzing et al. 2012). Specifically with regard to mainstreamed students with ASD, they are less liked by peers and more likely to be rejected, ignored, and purposely excluded by the peer group in comparison to their TD classmates (Chamberlain et al. 2007; Jones and Frederickson 2010; Locke et al. 2010). Students with ASD in general education settings

also receive less support from their classmates, spend more time in solitary activities, and spend less time in cooperative interactions with classmates (Humphrey and Symes 2011; Symes and Humphrey 2010). Important for the current study, students with ASD in general educational classrooms are more likely to experience peer victimization than those students with ASD in special education classrooms (Zablotsky et al. 2014).

Surprisingly, whereas negative peer experiences have long been recognized as one of the most important issues to address for successful inclusion into the general education setting (Dugan et al. 1995; Kamps et al. 1994), no studies have tested associations between specific classroom social experiences and poor educational outcomes among adolescents with ASD. This lack of information has prevented the development of interventions that adequately consider how social experiences might affect educational concerns of this group.

Current Study

The current study utilized data from two samples of adolescents with ASD to test the associations between various types of peer victimization and a range of educational outcomes. Research in typically developing adolescents has shown that it is important to distinguish between different types of victimization because each type of victimization has different causes and consequences, and some groups of individuals are more likely to experience certain types of victimization. Furthermore, research on successful anti-bullying interventions has found that addressing the specific forms of victimization is critical to reducing negative peer experiences (e.g. KiVA; Kärnä et al. 2013; Kärnä et al. 2011a, b). Therefore, the current study examined multiple types of peer victimization (i.e. verbal, relational, physical, ASD-related) to understand which specific types of peer victimization are associated with educational outcomes for adolescents with ASD. We were also interested in peer victimization experiences that might be particularly relevant to individuals with ASD. While it is important to examine the various forms of victimization that generalize across individuals and context, information about peer victimization that might arise specifically from ASD-related social deficits (e.g., making fun of the way an individual with ASD acts) is critically lacking.

Study 1 utilized parent reports of peer victimization and educational outcomes from families enrolled in the Interactive Autism Network (IAN) who completed the Bullying and School Experiences of Children with ASD Survey (BSE). This dataset was ideal for answering the current question at hand because it contains a large number of

families with adolescents with ASD, many who spend a majority of their school day in an inclusive setting, providing adequate statistical power for detecting the small to medium effect sizes usually found in similar studies. One drawback was that it included only parent reports of peer victimization and educational outcomes. This raises concerns that any association found between the criterion and the outcome measures could be due to shared method variance as a result of using one reporter. To address this issue, Study 2 utilized adolescent reports of peer victimization and parent reports of educational outcomes in a smaller sample of adolescent boys with ASD. While this sample was smaller and comprised of only boys, use of multiple informants reduces concerns that associations could be due to shared method variance. Self-reports of peer victimization are especially necessary to consider in research on mainstreamed adolescents with ASD, because parents and teachers are less likely to be aware of negative social experiences (Nishina and Bellmore 2010), given that there is less adult supervision in more inclusive settings. Moreover, in research involving both TD adolescents and adolescents with ASD, self-reports of social experiences are most predictive of negative outcomes (Adams et al. 2014; Juvonen et al. 2001; Whitehouse et al. 2009). Overall these two studies complement each other. Study 1 benefited from high statistical power and a large sample of adolescents with ASD but relied only on parent-reports and single item measures. Alternatively, Study 2 utilized a validated measure of peer victimization with multiple items, collected data from multiple reporters, but included a relatively small sample. Examining the current study questions across these two samples can provide greater confidence in the findings than would be allowed if either study was conducted separately.

Study 1

Method

Data for Study 1 came from parents recruited from a national registry of families, the Interactive Autism Network, which is comprised of families with children who have received a diagnosis of ASD from a medical professional. Families enrolled in the IAN registry were invited to participate in the BSE survey if their child was between the ages of 6 and 15 and had a current diagnosis of ASD ($n = 7328$). Of those invited, 1221 parents completed the 63-item, web-based survey, with most completing the survey in 20 min. See Zablotsky et al. 2012 and Zablotsky et al. 2014 for additional details concerning recruitment, incentives and other details of this data collection.

Participants

A total of 1221 parents completed the BSE survey. Within this group, the current study focused only on parents with adolescents (i.e. between the ages of 10 and 18) who spent at least half of the school day in a mainstream setting (as reported by the parent). This resulted in 432 parents. As seen in Table 1, the adolescents with ASD were, on average, 12.9 years of age, mostly male (85.2 %), white (91.2 %), and non-Hispanic (93.1 %), and mostly attended public school (94.0 %).

Measures

Victimization To measure peer victimization, parents were asked, *In what ways was (add child’s name) bullied during the past month?* A list of possible types of peer victimization was provided, and parents were asked to respond by indicating each type that applied. For the current study, *verbal victimization* and *physical victimization* was recorded as occurring if the parent responded affirmatively on at least one of two items (i.e. verbal = *being called bad names* and *being teased, picked on, or made fun of*; physical = *being pushed or shoved* and *being hit, slapped, or kicked*). *Being ignored*, one example of relational victimization, was measured with one item (i.e. *being ignored or left out of things on purpose*). ASD-related victimization was measured by another item that asked about other children *provoking* their child to react (i.e. *Has another child, who knows what bothers or upsets (add child’s name), used that knowledge to purposely trigger a meltdown or aggressive outburst in (add child’s name)?*). All responses were coded as yes (1) or no (0).

Educational Outcomes *Enjoying school* (i.e. *(add child’s name) enjoys school*), feelings of *Belonging* at school (i.e.

(add child’s name) feels like they belong at their school), feelings of *Safety* at school (i.e. *(add child’s name) feels safe at school*) were single item measures with answers ranging from 1 (strongly agree) to 4 (strongly disagree) (*Enjoy* $M = 2.15$, $SD = 0.86$; *Belonging* $M = 2.18$, $SD = 0.84$; *Safe* $M = 1.98$, $SD = 0.72$). *Academic performance* (i.e. *How would you describe (add child’s name) overall academic performance?*) was measured with a single item with ratings scaled from 1 (a great deal above average) to 5 (a great deal below average) with a mean of 2.80 ($SD = 1.26$). *Academic Problems* (i.e. *Have you been contacted by (add child’s name)’s teacher or a school administrator and told that they were having academic problems at school?*) and *Social Problems* (i.e. *Have you been contacted by (add child’s name)’s teacher or a school administrator and told that they were having social problems at school?*) were measured with single items with responses being yes (1) or no (0). Forty-nine percent reported academic problems and 74.1 % reported social problems.

Plan of Analysis

To examine the associations between peer victimization and educational outcomes, a series of multiple regressions (i.e., outcomes of enjoys, belongs, safe at school, and academic performance) and logistic regressions (i.e., outcomes of academic and social problems) were performed. For each type of regression, one of the educational outcome measures was the outcome variable. On the first step, age and gender were entered and one of the peer victimization measures was entered on the second step. Change in effect-size (R square change) from step 1 to step 2 was examined to assess the impact of each type of peer-victimization on the individual measures of educational outcome. It should be mentioned that preliminary analyses found that neither gender nor age moderated any of the associations between any of the peer victimization or well-being measures. Additionally, ethnicity and school type were omitted as control measures on the first step of the regressions since there was almost no variability for these measures (i.e. over 90 % of participants were in one category) which resulted in unreliable models in preliminary analyses. Finally, the regression analyses were also performed with each of the four peer victimization measures entered simultaneously into one regression, and the pattern of findings was the same as reported below in terms of which predictors were statistically significant. Since this is one of the first studies on this topic for those with ASD, we chose to report the separate regression analyses to provide as much information as possible.

Table 1 Demographic information for the study sample (N = 432)

Age, mean (SD)	12.9 (1.9)
Grade (%)	
4	8.6
5	17.1
6	21.8
7	13.9
8	14.1
9	13.0
10	7.9
11	3.7
Gender, male (%)	85.2
School type, public (%)	94.0
Race, white (%)	91.2
Race, Hispanic (%)	6.9

Results

The percentages of parents reporting that their child experienced each type of victimization were: verbal (43.1 %), physical (17.4 %), ignore (30.6 %), and provoke (63.5 %). Preliminary contingency coefficients were used to test the associations between the four types of peer victimization since each measure was categorical and dichotomous. All four types were associated with one another (contingency coefficients ranged from .17 to .56 all $ps < .01$). The strongest associations were between verbal victimization and being ignored (contingency coefficient = .56), verbal victimization and physical victimization (contingency coefficient = .40) and physical victimization and being ignored (contingency coefficient = .38). Being provoked was associated with each of the other three types of victimization, but relationships tended to be weaker (contingency coefficients ranged from .17 to .26).

The main analyses examined the associations between peer victimization and educational outcomes. As seen in Table 2 for the multiple regression findings, each type of victimization was significantly associated with enjoying school, belonging in school, and feeling safe at school. Specifically, experiencing victimization was associated with lower parent-reported feelings of enjoyment, belonging, and safety. Across these three outcomes, verbal victimization and being ignored had the strongest associations.

None of the measures of peer victimization had a statistically significant association with parent-reported academic performance. However, as seen in Table 3, verbal victimization, being ignored and being provoked (but not physical victimization) were all significantly associated with the likelihood that parents had been told by school staff about academic problems at school. These forms of victimization were also significantly associated with the likelihood that parents had been told by school staff about social problems at school .

Study 2

Method

Participants

Sixty-three adolescent boys between the ages of 10 and 17 and one of their parents were recruited from existing research or clinical registries at a pediatric hospital. Each adolescent had previously undergone a comprehensive assessment through either a specialty diagnostic clinic in the Division of Developmental and Behavioral Pediatrics

Table 2 Findings of multiple regressions examining the associations between peer victimization and educational outcomes for Study 1

	b	t-value	β	ΔR^2
Enjoys school				
Step 1				0.00
Age	0.01	0.66	0.03	
Gender	0.18	1.55	0.08	
Step 2				0.09***
Verbal victimization	0.53	6.51***	0.30	
Step 2				0.10***
Ignored	0.61	7.07***	0.33	
Step 2				0.03**
Physical victimization	0.37	3.43**	0.16	
Step 2				0.05***
Provoke	0.41	4.81***	0.23	
Belong to school				
Step 1				0.01
Age	0.03	1.51	0.07	
Gender	0.18	1.57	0.08	
Step 2				0.13***
Verbal victimization	0.61	7.86***	0.36	
Step 2				0.12***
Ignored	0.62	7.30***	0.34	
Step 2				0.06***
Physical victimization	0.51	4.80***	0.23	
Step 2				0.05***
Provoke	0.39	4.64***	0.22	
Safe at school				
Step 1				0.00
Age	0.01	0.69	0.03	
Gender	0.05	0.48	0.02	
Step 2				0.21***
Verbal victimization	0.67	10.76***	0.47	
Step 2				0.14***
Ignored	0.61	8.59***	0.39	
Step 2				0.14***
Physical victimization	0.73	8.55***	0.39	
Step 2				0.10***
Provoke	0.49	7.06***	0.33	
Academic performance				
Step 1				0.00
Age	0.03	0.80	0.04	
Gender	0.12	0.70	0.03	
Step 2				0.00
Verbal victimization	0.11	0.87	0.04	
Step 2				0.00
Ignored	0.04	0.32	0.02	
Step 2				0.00
Physical victimization	0.13	0.79	0.04	

Table 2 continued

	b	t-value	β	ΔR^2
Step 2				0.00
Provoke	0.09	0.69	0.03	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 3 Findings of multiple regressions examining the associations between peer victimization and educational outcomes

	Log ratio	Wald
Academic problems		
Step 1		
Age	1.21	12.75***
Gender	0.81	0.56
Step 2		
Verbal victimization	1.39	2.76*
Step 2		
Ignored	1.64	5.21**
Step 2		
Physical victimization	0.95	0.02
Step 2		
Provoke	1.38	2.47*
Social problems		
Step 1		
Age	1.03	0.21
Gender	0.60	2.85*
Step 2		
Verbal victimization	2.18	10.77**
Step 2		
Ignored	2.66	12.39***
Step 2		
Physical victimization	1.19	0.21
Step 2		
Provoke	4.07	35.90***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

or an ASD-focused research project within a large pediatric hospital. Diagnoses were made by a developmental pediatrician or a clinical psychologist using the following assessments: a parent interview and questionnaires, cognitive testing, language testing, and the Autism Diagnostic Observation Schedule (ADOS).

Inclusion criteria were as follows: (a) previous diagnosis of an ASD, including autism, Asperger’s Disorder, or PDD-NOS, (b) English-speaking, (c) fluent language abilities, which was defined as using complex sentences on a daily basis, and (d) between the ages of 10 and 17. A prescreening interview and follow-up screening prior to

completing the study found nine families did not meet inclusion criteria. This resulted in a total of 54 adolescents meeting criteria. The sample was primarily Caucasian (92.6 % Caucasian, 3.7 % Black, 1.9 % Asian, 1.9 % Bi-racial), with a mean age of 14.62 years (SD = 2.25; range 10.39–17.99 years). Parental reports of family income revealed that 26 % made less than \$50,000 a year, 46 % made between \$50,000 and \$100,000 a year, and 28 % made over \$100,000. See Adams et al. (2014) for additional details concerning recruitment, incentives and other details of this data collection.

Measures

Peer Victimization A modified version of the Schwartz Peer Victimization Scale (SPVS; Schwartz et al. 2002) was utilized to measure several types of self-reported peer victimization. On twelve items, adolescents indicated how often they had experienced each type of victimization using a seven-point scale (1 = *Never happens to me*, 2 = *Happens to me once a year* 3 = *Happens to me 2 to 3 times a year*, 4 = *Happens to me 4 to 6 times a year*, 5 = *Happens to me once or twice a month*, 6 = *Happens to me once or twice a week*, 7 = *Happens to me almost every day*). Four subscales were used: verbal (e.g., *How often do other kids call you names that hurt your feelings?*), relational (e.g., *How often do other kids gossip or say mean things about you?*), physical (e.g., *How often do other kids hit or push you?*), and victimization especially salient for those with ASD (e.g., *How often do other kids make fun of or tease you when you talk to them?*). Scales were created by summing and averaging scores for completed items for each subscale. All scales had acceptable internal reliability (verbal $\alpha = .84$, relational $\alpha = .78$, ASD related $\alpha = .88$) except physical ($\alpha = .55$).

Educational Outcomes The Child Behavior Checklist (CBCL; Achenbach and Rescorla 2001) is a 113-item parent-report measure designed to assess social and behavioral competencies and difficulties. Parents responded to all items indicating how true each statement was for their adolescent over the past 6 months using a three-point scale ranging from 0 = *Not true* to 2 = *Very true or often true*. For the current study we focused on the following 3 items: disobedient at school ($M = 0.43$ (SD = 0.6)), fears school ($M = 0.17$ (SD = 0.4)), and poor school work ($M = 0.59$ (SD = 0.7)).

Plan of Analysis

To examine the associations between peer victimization and educational outcomes, a series of multiple regressions

was performed. For each regression, one of the educational outcomes measures was the outcome. On the first step, age was entered and one of the four peer victimization measures was entered on the second step. Change in effect-size (R square change) from step 1 to step 2 was examined to assess the impact of each type of peer-victimization on the individual measures of educational outcome. Preliminary analyses found that age and income did not moderate any of the associations between the peer victimization and educational measures. In addition, ethnicity was omitted as a control measure on the first step of the regressions since there was almost no variability in this measure (i.e., over 92 % of participants were white), which resulted in unreliable models in preliminary analyses. As in Study 1, the regression analyses were also performed by simultaneously entering the four peer victimization measures into one regression, and the pattern in the findings were the same as reported below in terms of which predictors were significant. Since this is one of the first studies on this topic for those with ASD, we chose to report the separate regression analyses to provide as much information as possible.

Results

Means and standard deviations (the scaling runs from 1 to 7) for the peer victimization measures are as follows: verbal ($M = 2.82$, $SD = 1.8$); relational ($M = 2.75$, $SD = 2.0$); Physical ($M = 1.59$, $SD = 1.1$); ASD related ($M = 2.38$, $SD = 1.9$). Further, 35 % reported that, over the past month, they experienced at least one form of bullying every day, 50 % at least once a week, and 61 % at least once a month. Preliminary correlations were examined between the four types of peer victimization. All four types were significantly correlated with each other (r s ranged from .48 to .87 all $ps < .01$). The strongest associations were between verbal victimization and ASD-related victimization ($r = .87$), verbal victimization and relational victimization ($r = .79$) and relational and ASD-related victimization ($r = .76$). Physical victimization was also significantly correlated with each of the other three types of victimization (r s ranged from .48 to .54).

The main analyses examined the associations between peer victimization and educational outcomes. Verbal, relational, and ASD-related victimization, but not physical victimization, were significantly associated with disobedience at school (see Table 4). Higher rates of victimization were associated with higher ratings of being disobedient. Overall, verbal and ASD-related victimization had the strongest associations with being disobedient. Only verbal victimization was significantly associated with fearing going to school, with greater rates of verbal victimization

Table 4 Findings of multiple regressions examining the associations between peer victimization and educational outcomes for Study 2

	b	t-value	β	ΔR^2
Disobedient at school				
Step 1				0.02
Age	−0.03	−0.76	−0.11	
Income	−0.02	−0.33	−0.07	
Step 2				0.33***
Verbal victimization	0.18	4.93***	0.59	
Step 2				0.15**
Relational victimization	0.12	2.97**	0.41	
Step 2				0.04
Physical victimization	0.10	1.38	0.21	
Step 2				0.40***
ASD victimization	0.20	5.81***	0.67	
Fears going to school				
Step 1				0.02
Age	0.03	0.95	0.12	
Income	−0.02	−0.42	−0.08	
Step 2				0.08*
Verbal victimization	0.07	2.11*	0.30	
Step 2				0.04
Relational victimization	0.03	1.34	0.20	
Step 2				0.02
Physical victimization	0.06	0.98	0.14	
Step 2				0.05
ASD victimization	0.05	1.62	0.23	
Poor school work				
Step 1				0.02
Age	−0.03	−0.73	−0.10	
Income	−0.04	−1.71	−0.13	
Step 2				0.12**
Verbal victimization	0.14	2.53*	0.35	
Step 2				0.04
Relational victimization	0.07	1.38	0.21	
Step 2				0.00
Physical victimization	0.02	0.16	0.03	
Step 2				0.13**
ASD victimization	0.15	2.82**	0.39	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

being associated with higher rates of fearing school. Meanwhile, relational, physical, and ASD-related victimization were not significantly associated with fearing school. Finally, verbal and ASD-related victimization, but not relational or physical victimization, were significantly associated with poor school work. Higher rates of verbal and ASD-related victimization were associated with higher rates of poor school work.

Discussion

It is required by law that students with ASD be included in educational settings to the greatest extent possible. Not only does this give them exposure to typically developing peers, and access to a full range of normative social experiences (Delmolino and Harris 2012; Grindle et al. 2012; Lord and McGee 2001; Panerai et al. 2009), but, especially for students with ASD of average or above average cognitive and language abilities, inclusion in regular education is important to ensure that they are appropriately academically challenged. Unfortunately, while these characteristics of the general education setting offer important opportunities for growth in social competency for adolescents with ASD, they also increase the probability of negative peer interactions and experiences (Zablotsky et al. 2014). Moreover, educational outcomes for many adolescents in mainstream settings are poor (Estes et al. 2011; Jahromi et al. 2013).

Results of the two studies presented above provide insights into why cognitively-able adolescents with ASD have such high rates of educational difficulties. Across both samples, peer victimization was associated with educational outcomes, such as enjoying school, fearing school/feeling safe at school, and some measures of academic achievement.

Different patterns in the associations with educational outcomes emerged for each type of victimization. Overall, the strongest and most consistent associations with the educational outcome measures were with verbal victimization, followed by relational forms of victimization, including being ignored. Physical victimization had the least consistent and weakest associations with educational outcomes. In fact, physical victimization was not associated with any of the educational outcomes in Study 2. Relationships were not as consistent for other forms of peer victimization that may be particularly relevant to ASD (e.g., peers using knowledge of what bothers them to provoke them to be aggressive), but these forms of peer victimization had some of the strongest associations with negative educational outcomes, such as being disobedient at school, poor school work, and social problems at school.

There were also different patterns in the findings across the two studies. Overall, peer victimization was most strongly associated with being disobedient at school and social problems. However, some of the findings for similar educational constructs were inconsistent. For instance, Study 1 found that all forms of victimization were associated with feeling safe at school, but in Study 2 it was only verbal victimization that was linked to fear going to school. This may be explained by the fact that shared method variance influences the findings in Study 1 and these effects

disappear when information from multiple reporters is considered, as in Study 2. Alternatively, Study 2 may have been under-powered to detect certain associations. Similar discrepancies are found for the three measures of academic achievement, but these differences cannot be explained by shared method variance since the non-significant findings are only seen in Study 1. The pattern in the findings suggest that peer victimization was only associated with academic achievement when framed as having problems with academics, rather than asking about academic performance. It may be the case that “performance” elicits a broad/average report of overall academic achievement, while problems might be interpreted as any individual issue with a single class or incident. Future studies will need to ensure that multiple aspects and forms of measurement are utilized to evaluate academic achievement to better understand this issue.

The findings for being provoked in the current study are some of the first to examine the associations between aggressive behaviors exhibited by those with ASD and being targeted for peer victimization. These findings fall in line with studies of typically developing adolescents of a sub-group of aggressive victims (Olweus 1978; Perry et al. 1992; Schwartz et al. 2001). Specifically, these studies show that aggressive victims are seen as being hostile, irritable, and are disliked by the peer group (Olweus 1978; Prinstein and Cillessen 2003). In addition, the aggression that this sub-group exhibits make them more likely to be victimized in the future (Schwartz et al. 2001) and is characterized as emotionally dysregulated, under controlled, reactive, and ineffectual (Perry et al. 1992; Schwartz 2000; Schwartz et al. 2001), which is similar to the characteristic of the types of aggression that co-occurs in some adolescents with ASD (Farmer et al. 2014; Farmer and Aman 2011). These findings suggest that particular attention should be paid to issues around aggression in terms of being a target as well as perpetration when addressing negative peer experience of adolescents with ASD.

Based on literature in TD children and adolescents, there are multiple empirically supported theories for explaining why negative social experiences, such as peer victimization, would affect educational outcomes. One of the most common is that these experiences cause psychological and emotional distress, and distress leads to negative school adjustment (Buhs et al. 2006; Juvonen et al. 2006; Nishina et al. 2005). Additionally, it has been suggested that cognitive development and academic motivation might be hindered due to lack of cooperative engagement and increased rates of negative interaction (Wentzel 2005). It will be important to test these and other possible mechanisms of change in future studies. This information is

crucial to designing interventions to address academic under-achievement.

The current study's findings are the initial step towards understanding what negative experiences are the most impactful for this specific group of students. In order for interventions to reduce peer victimization to be successful, they must be designed to address specific types of social experiences (e.g. KiVA; Kärnä et al. 2013, 2011b). Addressing specific social experiences (and specific social skills tied to those experiences) as a means of improving school outcomes, is expected to be especially fruitful, because both social experiences and social skills have been shown to be malleable to change through intervention (e.g. Cotugno 2009; Derosier et al. 2011; Koning et al. 2013; McMahan et al. 2013; Schohl et al. 2014; Weiss et al. 2013). Thus, information gained from the current study provides a clear impetus to investigate the utility of social skills interventions in improving academic outcomes. For instance, the current study found ASD-related peer victimization to have some of the strongest associations with negative educational outcomes. This suggests that interventions may need to specifically focus on reducing negative experiences that may arise directly from ASD-related behaviors. Future research will need to examine a wider range of negative experiences that arise from ASD-related behaviors to not only understand what experiences to target, but also what social skills need to be developed to prevent negative experiences.

Limitations

It is important to first acknowledge that the direction of the associations in these studies cannot be determined due to reliance on cross-sectional data. In other words, in the current studies, it cannot be determined if victimization leads to poor school adjustment, or if school adjustment leads to victimization, which can only be determined using a longitudinal design. Likely it is both: Studies in TD adolescents have shown associations between victimization and adjustment measures to be bi-directional (Reijntjes et al. 2010). Another significant limitation of these studies is that all the educational outcome measures were single item measures, which raises concerns about measurement error of these constructs. Another issue in terms of measurement error is the fact that the physical victimization scale in Study 2 had low internal consistency. This could explain, at least in part, the null findings for physical victimization in that study. There are other limitations that should be mentioned, including possible sampling biases. For example, Study 2 was described as a study of peer experiences in general, but Study 1 was most likely described as being related to bullying (we do not know for

sure since this is a secondary data analysis). Thus, parents of adolescents who had peer difficulties may have been more likely to participate. Additionally, both studies were primarily comprised of Caucasian males from higher income households. This raises concerns about the generalizability of the findings to the broader population of individuals with ASD. It should also be noted that results from this study only apply to adolescents with ASD who are spending the majority of their day in general educational settings. Finally, it is important to note that the educational outcome questions in Study 1 do not have a specific time frame attached to the items, whereas Study 2 measures are all framed around specific time periods. Further, the open-endedness of the of the educational outcomes questions in Study 1 makes it difficult to know if the associations between peer victimization and the educational outcome measures are driven by recent or past events.

Conclusions

Overall, these findings add to accumulating evidence that negative peer experiences (including peer victimization), which many adolescents with ASD face on a daily basis, likely have negative repercussions for their psychological health, general well-being, and now, educational functioning. The urgency to create interventions to directly address negative peer experiences in this group is becoming increasingly clear. The current study provides possible insights for creating such interventions. Specifically, it suggests that, while interventions should address many forms of peer victimization, there should be consideration for a special focus on verbal victimization, being ignored and excluded, as well as those forms of victimization that may be particularly relevant for adolescents with ASD, such as being provoked to display strong behavioral reactions. Identifying anti-bullying strategies that are the most salient to adolescents with ASD could result in interventions that are more effective with this specific population.

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Compliance with Ethical Standards

Conflict of interest Ryan Adams, Julie Taylor, Amie Duncan, and Somer Bishop declare no conflict of interest.

Ethical Approval The data described for the first study were part of a secondary data analysis and the current authors were not part of the procedures for collecting this data. The principle investigator of the primary data collection of this data was in accordance with ethical standards of institutional research committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All procedures performed in the second study described in this manuscript were performed by the first and last authors and were in accordance with ethical standards of institutional research committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent The first study described is a secondary data analysis but in the primary data collection, informed consent was obtained by from all individual participants included in the study. For the second study, the first and second authors obtained informed consent from all parents included in the study as well as informed assents from all adolescents.

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