Influence of the Teacher-student Relationship and School Participation on the Engagement of Adolescent Students with and Without Autism Spectrum Disorder

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ABSTRACT:

The teacher-student relationships, school participation, and student engagement strongly influence adolescent well-being and learning. However, these factors often represent barriers for students with autism spectrum disorder (ASD) compared to their typically developing (TD) peers. A non-experimental, correlational, cross-sectional design was used to assess the teacher-student relationship and school engagement of adolescents with ASD compared to their typically developing peers and to examine their impact on school engagement. A total of 102 adolescents between 5th grade and 12th grade (M = 13.29; SD = 1.75) participated, 51 of whom had ASD. The Teacher Student Relationship subscale of the Student Engagement Instrument (Appleton et al., 2006), the School Engagement Scale (SPS; John-Akinola & Nic-Gabhainn, 2014), and the Multidimensional Scale of School Engagement (MSSE; Wang et al., 2019) were applied. Results indicate that teacher-student relationship and school engagement are high in both groups, but adolescents with ASD show lower overall school engagement. A significant positive association was found between teacher-student relationships, school participation, and school engagement in both groups.

Keywords: Autism Spectrum Disorder, Teacher-student Relationship, School Engagement, School Participation, Adolescents.

INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by persistent difficulties in social communication, both verbal and nonverbal, and by the presence of repetitive and restricted behaviors (First et al., 2022). In recent years, an increase in the global prevalence of ASD diagnosis has been observed. Worldwide, 65 out of every 10,000 births are diagnosed with this condition, with a ratio of 4.2 males for every female (Zeidan et al., 2022). In Chile, the current prevalence of ASD in the population is not yet clearly defined (Rojas et al., 2019; Yáñez et al., 2021). However, it is estimated that approximately 1.5% of children under 8 years of age could have ASD (Rojas et al., 2019).

Research shows that, despite the positive progress in inclusion and support provided to students with ASD in mainstream school settings over the past decades, students with ASD still face multiple barriers to having full participation in mainstream schools (Ambrose et al., 2022; Hodges et al., 2020; Maciver et al., 2020; Simpson et al., 2019). Literature shows that students with ASD are more vulnerable to being victims of bullying compared to their typically developing (TD) peers (e.g., Ashburner et al., 2019; Hwang et al., 2018; Ochi et al., 2020), and deficiencies persist in the educational response due to teachers' lack of knowledge about ASD (Hodges et al., 2020; Sabat et al., 2019). These aspects would negatively affect the development and school engagement of students with ASD and make research on school engagement in students with ASD a crucial topic, especially in adolescence.

Adolescence is a stage characterized by significant cognitive, affective, and sexual changes, as well as emotional instability, in which social support and belonging to a group play an essential role. Therefore, schools need to be safe spaces that provide both learning and support, allowing adolescents to feel part of a community. In this context, the quality of the teacher-student relationship (Bakadorova & Raufelder, 2018; Jowett et al., 2023; Pastore & Luder, 2021) and school engagement are key variables.

The teacher-student relationship has been recognized as fundamental to the success of any educational intervention (Poling et al., 2022) and to better academic performance in TD students (Pastore & Luder, 2021). In the case of students with ASD, a positive teacher-student relationship can act as a protective factor, encouraging participation (Losh et al., 2022a) and school engagement (Roorda et al., 2021). While there is some research on the teacher-student relationship in students on the autism spectrum, evidence directly addressing this relationship from the students' perspective remains limited. Only two studies have examined this relationship from the viewpoint of autistic students, which is an essential methodological distinction, as one of these studies demonstrates that teachers and students perceive and evaluate the relationship differently (Losh et al., 2022b). Furthermore, so far, only a study by Roorda et al. (2021) has addressed the impact of the teacher-student relationship on the school engagement of students with ASD. This study found that students on the autism spectrum have teacher-student relationships characterized by greater conflict, with the relationship between teacher-student conflict and school engagement being stronger for students with ASD than for TD students. However, this research had significant methodological problems, such as the lack of females in the sample and comparing students attending different types of schools (Zañartu & Pérez-Salas, 2023).

Additionally, studies in the field (e.g., Ambrose et al., 2022; Lüddeckens, 2021; Maciver et al., 2020) highlight that limited school participation during adolescence may have long-term implications for learning and personal development, which, in turn, may restrict opportunities for social participation in adulthood for individuals with ASD. School participation is defined as students' overall involvement in the day-to-day life of the school, including participating in school activities and events, making decisions, interpersonal relationships in the school environment, having a sense of belonging, and ensuring equal participation for the entire educational community (John-Akinola & Nic-Gabhainn, 2014).

Research by Chang et al. (2018) shows that school participation in adolescents with ASD is lower compared to their peers with TD, especially in those students with ASD who need higher levels of support. Similarly, Hodges et al. (2020) noted that children with ASD aged 6-11 face limitations in school participation due to internal factors, such as their sense of belonging, and external factors, such as school culture and teacher knowledge about ASD. However, several authors suggest that existing studies have limitations, in part due to the historical lack of adequate tools to assess school participation in schools, so school participation has often been evaluated through third-party perceptions (Adair et al., 2018; Alkeraida, 2021; Chang et al., 2018; Hodges et al., 2020; Maciver et al., 2020; Teixeira & Morgado, 2016).

The teacher-student relationship and school participation influence the school engagement of TD students (Lara et al., 2022), but these relationships have been

scarcely studied in the context of ASD. School engagement is defined as students' active involvement in their educational process and encompasses behavioral, emotional, cognitive, and social dimensions (Fredricks et al., 2016). While school participation refers to students' involvement in school activities and decision-making, emphasizing behavioral aspects, school engagement reflects a deeper psychological investment in learning and belonging. Research that has studied school engagement has done so largely in TD adolescents, leaving little evidence on what happens with this construct in students with ASD and how it relates to the teacher-student relationship and school participation (Ewe, 2019; O'Donnell & Reschly, 2020). Examining variables that can influence school engagement is fundamental since school engagement is associated with higher academic achievement and class attendance and lower dropout rates and behavioral problems (Appleton et al., 2008; Saracostti et al., 2019; Lara et al., 2022).

From this background, the following research question was posed: How are teacher-student relationships and school participation associated with the school engagement in adolescents with ASD and their TD peers, and do these associations differ between these groups? Thus, the present study aimed to examine the associations between school participation, teacher-student relationship, and school engagement in adolescents with ASD and TD and to explore whether these associations differ between and within these groups.

METHOD

The present study followed a quantitative, non-experimental, cross-sectional, comparative, and correlational design. This approach allows us to observe the phenomenon in its natural context, collecting quantitative data at a single point to establish later relationships between the variables (Hernández et al., 2014; Howitt & Cramer, 2011).

Participants

The participants were 102 adolescents between the ages of 10 and 18 (M = 13.29; SD = 1.75) who were between 5th grade and 12th grade in regular schools with a School Integration Program (PIE) in the city of Concepción, Chile. The PIE is a national program in Chile that promotes inclusive education by providing additional support to students with special educational needs, including those with ASD. It operates under a partial integration model, meaning that students with ASD attend regular classrooms but receive specialized support from special education teachers, most of whom have received specific training on autism. This support can include individualized instruction, curriculum adaptations, and therapeutic interventions.

Convenience sampling was used. Fifty-one ASD students participated in the PIE; the other 51 were TD adolescents. Forty participants were female (39.22%), 60 were male (58.82%) and two identified with another gender (1.96%). Significant differences were found in gender ratio ($\chi^2 = 6.00$, $p < .05$) and age between the groups, with greater female representation observed in the TD group. In comparison, the ASD group had greater male representation and was, on average, one year older ($\chi^2 = 16.267$, $p = .039$).

Variables and instruments

- Teacher-student relationship (TSR): The Teacher-Student Relationship subscale of the School Engagement Instrument (SEI) of Appleton et al. (2006) was used to measure the TSR. This subscale is composed of 9 Likert-type items with values from 1 to 4 points (1 = extremely disagree; 4 = extremely agree) (e.g., "*My teachers are available to me when I need them*"). In their original version, the authors reported internal consistency with an overall Cronbach's alpha of .88. The full scale was validated in Chile by González et al. (2022), obtaining alphas and omegas between .76 and .88.
- School Participation (SP): The School Participation Scale (SPS) of John-Akinola and Nic-Gabhainn (2014) was used. This instrument is made up of 25 Likert-type items (e.g., "*Participating in school is fun*") with values from 1 to 5 points (1 = never; 5 = always). In its original version, the authors reported heterogeneous reliability in its dimensions (with α between .60 and .70). The instrument was validated in Chile by Pérez-Salas et al. (2019), who obtained good reliability indices, with omegas between .83 and .87. Regarding construct validity, factor analysis confirmed the presence of a general school engagement factor, in addition to the four dimensions contemplated in the scale ($x^2_{(244,1428)} = 1412.28$, $p < .001$, CFI = .97, RMSEA = .05) (Pérez-Salas et al., 2019).
- School Engagement (SE): School Engagement was measured through the Multidimensional Scale of School Engagement (MSSE) by Wang et al. (2019), composed of 37 Likert-type items with values from 1 to 5 points (1 = very different from me; 5 = very similar to me), which measure school engagement and disengagement. The school engagement variable

contains 19 items divided into four dimensions: behavioral engagement, cognitive engagement, emotional engagement, and social engagement (e.g., "*I plan how to finish my homework*"). The school disengagement variable is made up of 18 items divided into four dimensions: behavioral disengagement, cognitive disengagement, emotional disengagement, and social disengagement (e.g., "*I feel overwhelmed by my schoolwork*"). This scale was used in its entirety in Chilean school children with an alpha coefficient of 0.902 (ω = 0.902) for the engagement and 0.869 (ω = 0.869) for the disengagement factor (Pérez-Salas et al., 2021). For this study, each measure (engagement and disengagement) was used separately for the analyses.

Procedure

The present study was authorized by the Ethics, Bioethics, and Biosafety Committee of the Universidad de Concepción (code CEBB 1525-2023). To gain access to the sample, contact was established with ASD communities and regular schools with PIE in the city of Concepción. After obtaining the approval of the institutions, informed consent was requested from the parents or legal guardians of the students to authorize their participation in the study. After this, students were invited to participate. They had to sign an informed consent form and subsequently complete the self-report questionnaire on the school premises.

Data analysis

For statistical analyses, JASP software version 0.18.3 was used. First, a descriptive analysis was performed to characterize the sample, and then inferential analyses were carried out. Normality was examined using the Shapiro-Wilk test, and homogeneity of variances was evaluated using Levene's test. All assumptions were met, except for age equivalency between groups. Since the groups differed in age, ANCOVA was used to evaluate the possible effect of age on each variable. In the behavioral and cognitive disengagement variables, an effect of age was observed, so this factor was adjusted for with ANCOVA. For the other variables, the means were compared with the t-test. Finally, multiple linear regression analyses were performed using the Enter method to measure the impact of the teacher-student relationship and school participation on school engagement. The assumption of homogeneity of the regression coefficients for age was verified for all the variables evaluated (teacher-student relationship, school participation, and school engagement), with p-values > 0.05 in all cases. This allowed age to be included as a covariate in the analysis. The interpretations of the effect sizes are based on Cohen (1988). For Cohen's d: 0.20: small, 0.50: medium, 0.80: large, and for r: 0.10: small, 0.30: medium, 0.50: large.

RESULTS

Regarding TSR, the group of students with ASD obtained a mean of 28.725 (*SD* = 4.678), while the TD group obtained a mean of 28.941 (*SD* = 4.925). Both means are close to the average reported in the Chilean validation sample of González et al. (2022), indicating that both groups of students maintain a favorable perception of their bond with their teachers.

Concerning school participation, the ASD group obtained a mean of 91.647 (*SD* = 17.201), and the TD group had a mean of 95.118 (*SD* = 17.160). The overall scores of the ASD group are similar to the mean obtained in the Chilean validation sample of Pérez-Salas et al. (2019), which shows that the levels of school participation are appropriate. However, the TD group's overall scores exceed the validation sample's average by more than one standard deviation, suggesting that the sample for this study showed high levels of school participation (John-Akinola & Nic-Gabhainn, 2014).

In total school engagement, the ASD group obtained a mean of 68.333 (*SD* = 14.329), and the TD group had a mean of 74.922 (*SD* = 13.575). These values indicate a slightly lower total school engagement in the ASD group compared to the TD group, which indicates that adolescents with ASD are less engaged academically than their peers. On the other hand, in the school disengagement dimension, the ASD group reported a mean of 42.980 (*SD* = 11.899), and in the TD group, a mean of 38.137 (*SD* =14.083). The overall results for the ASD group are higher in contrast to the TD group, suggesting that adolescents with ASD are more disengaged from school compared to their peers with TD (Table 1).

ANCOVA results revealed that age had no significant impact on teacher-student relationship ($F_{(1,99)}$ = .018, p = .894), total school participation ($F_{(1,99)}$ = .087, p = .768) or any of its subdimensions (participation in decisions and rules ($F_{(1,99)}$ =. 442, p = .507); participation in school events ($F_{(1,99)}$ = .442, p = .508); participation in extracurricular school activities ($F_{(1,99)}$ = .342, p = .560) and positive perception of school participation ($F_{(1,99)}$ = .009, p = .923)). Similarly, age did not significantly influence total school engagement ($F_{(1,99)}$ = .063, p = .803), nor its dimensions (behavioral engagement ($F_{(1,99)}$ =. 979, p = .325); cognitive ($F_{(1,99)}$ = 1.756, p = .188), emotional ($F_{(1,99)}$ = .003,

Table 1 **Descriptive statistics of teacher-student relationship, school participation, and school engagement in ASD and TD**

Subscales		ASD				TD			
		M (SD)	Min-Max	Kurtosis	Skewness	M (SD)	Min-Max	Kurtosis	Skewness
Teacher-Student Relationship	TSR*	28.725 (4.678)	17-36	-.239	-.345	28.941 (4.925)	17-36	-.234	-.522
School Participation	PDR*	22.078 (4.251)	11-30	.262	-.564	22.216 (4.268)	14-29	-1.021	-.149
	PSE*	23.353 (5.538)	7-30	1.504	-1.360	23.980 (3.947)	15-30	-.523	-.340
	PEX*	23.039 (8.745)	7-35	-1.100	-.365	25.314 (8.098)	7-35	-.517	-.666
	PPP*	23.176 (5.210)	10-30	-.561	-.459	23.608 (5.492)	11-30	-.439	-.730
	TSP*	91.647 (17.201)	51-119	-.193	-.434	95.118 (17.160)	60-123	-1.012	-.098
School Engagement	BEHE*	14.157 (3.695)	6-20	-.837	-.189	15.647 (3.537)	5-20	-.064	-.602
	COGE*	18.059 (4.684)	7-25	-.395	-.418	19.490 (4.474)	8-25	-.225	-.593
	EMOE*	18.392 (4.729)	9-25	-1.073	-.257	19.980 (4.240)	7-25	.243	-.723
	SOCE*	17.725 (4.964)	5-25	-.306	-.620	19.804 (4.205)	7-25	.144	-.702
	TSE*	68.333 (14.329)	39-93	-.812	-.013	74.922 (13.575)	29-95	1.254	-.793
School Disengagement	BEHD*	18.549 (6.407)	8-32	-.896	.124	15.922 (6.590)	8-39	2.282	1.425
	COGD*	4.510 (2.301)	2-10	-.088	.807	4.588 (2.299)	2-10	-.771	.468
	EMOD*	11.627 (4.317)	4-20	-1.013	-.222	10.000 (4.737)	4-20	-.652	.593
	SOCD*	8.294 (3.546)	4-18	-.259	.608	7.627 (3.736)	4-20	.712	.985
	TSD*	42.980 (11.899)	21-74	-.278	.257	38.137 (14.083)	18-89	1.831	1.112

**STR: Student-teacher relationship; PDR: Participation in decisions and rules; PSE: Participation in school events; PEX: Participation in extra-curricular school activities; PPP: Positive perception of school participation; TSP: Total school participation; BEHE: Behavioral engagement; COGE: Cognitive engagement; EMOE: Emotional engagement; SOCE: Social engagement; TSE: Total school engagement. BEHD: Behavioral disengagement; COGD: Cognitive disengagement; EMOD: Emotional disengagement; SOCD: Social disengagement; TSD: Total school disengagement.*

p = .959) and social ($F_{(1,99)}$ = .031, p = .860)). Also, no significant effects of age on the dimensions of emotional disengagement ($F_{(1,99)}$ = 2.335, p = .130) and social disengagement ($F_{(1,99)}$ = .604, p = .439) were found.

However, age showed a significant influence on total disengagement ($F_{(1,99)}$ = 5.059, p = .027), as well as on behavioral ($F_{(1,99)}$ = 4.734, p = .032) and cognitive disengagement ($F_{(1,99)}$ = 4.029, p = .047), observing that the school disengagement levels also increase with increasing student age.

There were no significant differences in the total scores of the teacher-student relationship variable between the ASD and TD groups. The mean Likert scale scores for both groups were close to 3 (ASD group = 2.92; TD group = 3.35), which corresponds to the "agree" option, reflecting a positive perception of the teacher-student relationship (Table 2).

Regarding school participation, there are no statistically significant differences between the ASD and TD

Table 2 **Comparative statistics of teacher-student relationship, school participation, and school engagement in ASD and TD**

Variables	ASD M(DE)	TD M(DE)	t(gl)	p	d
TSR*	28.73(4.68)	28.94(4.93)	–.227(100)	.821	–.045
PDR*	22.08(4.25)	22.22(4.27)	–.163(100)	.871	–.032
PSE*	23.35(5.54)	23.98(3.95)	–.659(100)	.511	–.130
PEX*	23.04(8.75)	25.31(8.10)	–1.363(100)	.176	–.270
PPP*	23.18(5.21)	23.61(5.49)	–.407(100)	.685	–.081
TSP*	91.65(17.20)	95.12(17.16)	–1.020(100)	.310	–.202
BEHE*	**14.16(3.70)**	**15.65(3.54)**	**–2.080(100)**	**.040**	**–0.412**
COGE*	18.06(4.68)	19.49(4.47)	–1.578(100)	.118	–.313
EMOE*	18.39(4.73)	19.98(4.24)	–1.786(100)	.077	–.354
SOCE*	**17.73(4.96)**	**19.80(4.21)**	**–2.282(100)**	**.025**	**–.452**
TSE*	**68.33(14.33)**	**74.92(13.56)**	**–2.384(100)**	**.019**	**–.472**
BEHD*	**18.55(6.41)**	**15.92(6.59)**	**2.041(100)**	**.044**	**.404**
COGD*	4.51(2.30)	4.59(2.30)	–.172(100)	.864	–.034
EMOD*	11.63(4.32)	10(4.74)	1.813(100)	.073	.359
SOCD*	8.29(3.55)	7.63(3.74)	.924(100)	.358	.183
TSD*	42.98(11.90)	38.14(14.08)	1.876(100)	.064	.372

**STR: Student-teacher relationship; PDR: Participation in decisions and rules; PSE: Participation in school events; PEX: Participation in extra-curricular school activities; PPP: Positive perception of school participation; TSP: Total school participation; BEHE: Behavioral engagement; COGE: Cognitive engagement; EMOE: Emotional engagement; SOCE: Social engagement; TSE: Total school engagement. BEHD: Behavioral disengagement; COGD: Cognitive disengagement; EMOD: Emotional disengagement; SOCD: Social disengagement; TSD: Total school disengagement.*

groups. Both groups show high school participation, with mean scores on the Likert scale close to 4 (ASD group = 3.38; TD group = 3.77), suggesting an inclination towards the "almost always" option. When analyzing the dimensions of school participation, results show that there are also no significant differences between the ASD and TD groups. In each of these dimensions, both groups report high scores: participation in decisions and rules (ASD group = 3.68; TD group = 3.70), school events (ASD group = 3.89; TD group = 3.99), extra-curricular activities (ASD group = 3.29; TD group = 3.61) and positive perception of school participation (ASD group = 3.86; TD group = 3.94). These scores, located between 3 and 4 on the Likert scale, are equivalent to "sometimes" and "almost always" on the Likert scale.

Concerning school engagement, results reveal statistically significant differences in ASD and TD groups. The ASD group shows a lower school engagement compared to the TD group, with a mean score of 3.8 on the Likert scale for the ASD group. In contrast, the TD group reaches scores above 4 (TD group = 4.16), reflecting an inclination towards the options "neither different nor similar to me" and "similar to me," respectively, and representing a small to medium effect size.

When analyzing the dimensions of school engagement, some differences between groups are also observed. In the behavioral and social engagement dimension, the *t*-test reveals statistically significant differences, indicating that the ASD group shows lower behavioral (ASD group = 2.36; TD group = 2.61) and social engagement (ASD group = 2.96; TD group = 3.30) than the TD group. For the cognitive and emotional engagement dimension, the *t*-test shows no significant differences between ASD and TD groups. Both groups report moderate levels of cognitive (ASD group = 2.58; TD group = 2.78) and emotional engagement (ASD group = 3.07; TD group = 3.33). These differences also represent small to medium effect sizes.

In total school disengagement, the covariate age was found to be significant ($F_{(1,99)} = 5.059$; $p = .027$). Controlling for the effect of age, statistically significant differences between groups were identified, with the ASD group showing higher levels of school disengagement ($M_{ASD} = 43.74$; $M_{TD} = 37.37$). Regarding the dimensions

of school disengagement, the results show that age also had a statistically significant effect on behavioral ($F_{(1,99)}$ = 5.020; p = .027) and cognitive disengagement ($F_{(1,99)}$ = 4.409; p = .038). When discounting the age effect, significant differences were identified between the ASD and TD groups, where the ASD group presented a higher level of behavioral (small to medium effect size) (M_{ASD} = 18.92; M_{TD} = 15.54) and cognitive disengagement (small effect size) (M_{ASD} = 4.64; M_{TD} = 4.46).

As for emotional and social school disengagement, there are no significant differences between the two groups. Both groups show low levels of emotional disengagement (ASD group = 1.94; TD group = 1.67) and social disengagement (ASD group = 1.38; TD group = 1.27), with scores on the Likert scale above one, indicating a tendency towards the option "very different from me."

The result of the multiple linear regression to analyze the influence of teacher-student relationship and school participation on school engagement was statistically significant ($F_{(3,98)}$ = 26.948, p < .001, R^2 = .452), attributing 45.2% of the variability in school engagement to the variables teacher-student relationship, school participation, and condition (ASD or TD). This means that the increase of one point in the teacher-student relationship results in a .63-point increase in school engagement, controlling for the other variables. Similarly, a one-point increase in school participation translates into a .40-point increase in school engagement. Lastly, having TD increases school engagement by 5.055 points.

The regression models for each of the dimensions of school engagement were statistically significant: behavioral engagement ($F_{(6,95)}$ = 11.628, p < .001, R^2 = .423), cognitive ($F_{(1.99)}$ = 5.641, p < .001, R^2 = .263), emotional ($F_{(1,99)}$ = 22.745, p < .001, R^2 = .590) and social ($F_{(1,99)}$ = 10.873, p < .001, R^2 = .407). These effect size values reflect medium to large effect sizes.

Although the model was significant in all dimensions of school engagement, only some specific variables significantly impacted each dimension. In behavioral engagement, participation in extracurricular activities and positive perception of involvement increased engagement by .156 and .260 points, respectively. For cognitive engagement, participation in school events only had an influence, increasing it by .237 points. Positive perception of participation and student status (belonging to the TD group) significantly affected emotional engagement, with increases of .539 and 1.279 points, respectively. Finally, only positive perception and belonging to the TD group affected social engagement, increasing school engagement by .571 and 1.717 points. The teacher-student relationship and the dimension of participation in decisions and rules did not significantly impact any of the dimensions of school engagement.

DISCUSSION

The present study aimed to examine the associations between the teacher-student relationship, school participation, and school engagement in adolescents with ASD and TD and to explore whether these associations differ between and within these groups in regular school settings. The results of this study indicate that there are no significant differences in the quality of the teacher-student relationship and school engagement between adolescents with ASD and TD. Both groups positively rated the relationship with teachers and their participation in school activities. These findings contrast with previous research, which suggests that students with ASD tend to experience more challenging relationships with teachers (Blacher et al., 2014; Chang et al., 2018; Losh et al., 2022a) and greater difficulties in their school participation (Hodges et al., 2020; Simpson et al., 2018; Simpson et al., 2019).

The positive teacher-student relationships and school participation observed in this study may be attributed to the teachers' knowledge of ASD. As stated by Esqueda et al. (2024) in their systematic review, secondary school teachers' understanding of ASD facilitates their relationships with adolescents with ASD, as it enables them to implement more effective interaction strategies and inclusive practices that address their individual needs (Esqueda et al., 2024; Narzisi et al., 2024).

Consistent with these findings, this study aligns with those of Zañartu and Pérez-Salas (2023), who found no significant differences in the teacher-student relationship between adolescents with ASD and their TD peers attending regular Chilean schools. The authors suggest that this phenomenon could be related to implementing the School Integration Program (PIE). This program may explain the positive teacher-student relationships observed by adapting curricular content and providing individualized support from special education teachers. It is this closer connection between students with ASD and special education teachers that could positively influence their school experience.

On the other hand, the high perceived school participation observed in this study may be influenced by the severity or level of support required by the ASD participants. According to Li et al. (2024), difficulties related to school participation tend to be greater for students with ASD who require more intensive support compared to

those classified as level one under the DSM-V-TR label or "high-functioning." Although the exact severity of ASD in this sample is not specified, it can be inferred that by attending regular schools rather than special schools, the adolescents are likely to fall within level one, which would explain why they face fewer challenges in participating in a regular school setting compared to peers with more pronounced ASD traits, who may encounter greater difficulties in school participation (Li et al., 2024).

Another possible explanation for the discrepancy between the results of this study regarding the teacher-student relationship, participation, and school engagement and the findings found in previous research could be the methodology used. In the study by Losh et al. (2022a), the teacher-student relationship quality was assessed solely based on teachers' perceptions. Additionally, school engagement was measured only in its behavioral dimension through self-reports, focusing on preschoolers with ASD. These differences in sample characteristics and variable measurement may have influenced the divergence in results. It is important to recognize that interpersonal relationships, such as the teacher-student relationship, are complex and shaped by factors such as social skills, attitudes, and individual beliefs. This suggests that the perception of relationship quality may be biased depending on who reports it, affected by factors like social desirability or preconceived attitudes toward certain behaviors or learning difficulties (Poling et al., 2022). Furthermore, evaluations made by parents and teachers are often shaped by their expectations and experiences, which can influence their perception of school engagement. This multifaceted variable is difficult to measure objectively (Simpson et al., 2019).

Another methodological difference that may explain the divergent results with previous research is how school participation is conceptualized. For instance, Chang et al. (2018) assessed four categories: home, community, school, and daily activities. While these categories are similar to the dimensions proposed by John-Akinola and Nic-Gabhainn (2014), which were used in this study, Chang et al.'s approach does not focus exclusively on the school setting. The depth with which these categories were examined within the school context could account for the divergent results. Chang et al. (2018) explored aspects such as friendship quality, participation in various activities (including school activities), and emotional well-being. In contrast, the present study emphasizes involvement in decision-making and rules, school events, extracurricular activities, and positive perceptions of adolescents.

In addition, other school-level factors may contribute to the high levels of school participation observed in this study. School-wide policies that promote inclusion and structured peer support programs can play a significant role in fostering participation for students with ASD. Furthermore, parental involvement and advocacy for inclusive practices could also influence students' school experiences. However, the present research did not address these variables, and future research should test and compare the influence of these variables on school participation in ASD students.

In terms of school engagement, differences between groups were observed. Although the difference in engagement scores was statistically significant, both groups reported moderate to high engagement, suggesting that while ASD students show slightly lower engagement, their participation remains substantial. However, this study reveals significant differences in the behavioral and social dimensions, with TD adolescents showing higher levels compared to their peers with ASD. This suggests that TD adolescents tend to display appropriate behavior, higher productivity, and participation in both academic and extracurricular activities, as well as better quality social interactions inside and outside the classroom, compared to adolescents with ASD (Wang et al., 2019; Rimm-Kaufman et al., 2015). These differences align with the slight variations observed in overall school engagement, and differences may be attributed to the social and behavioral challenges faced by ASD adolescents, which include difficulties in forming and maintaining social relationships, along with the presence of restricted, repetitive, and inflexible patterns of behavior and interests (Grosso, 2021). In the school context, these challenges can impact how adolescents perceive their social relationships and friendships (Saban-Bezalel et al., 2025). Additionally, it is common for students with ASD to show reduced interest in their peers and engage in more limited social interactions compared to their TD counterparts (Rosello et al., 2021), which may partially explain the observed differences in school engagement.

On the other hand, no significant differences were found between adolescents with ASD and their TD peers in the dimensions of cognitive and emotional engagement. This suggests that both groups exhibit similar positive affective attitudes toward their educational institutions, as well as comparable processes of reflection and willingness to engage with complex ideas (Wang et al., 2019; Rimm-Kaufman et al., 2015). These findings contrast with those of Pérez-Salas et al. (2021), who reported higher levels of cognitive, emotional, and social engagement among ado-

lescents with special educational needs (SEN), excluding ASD, compared to their TD peers. A possible explanation for this discrepancy is that the Pérez-Salas et al. (2021) study did not include students with ASD in their sample. Although SEN encompasses a range of characteristics, the specific educational supports and unique features of ASD may have influenced how adolescents experience and express their cognitive and emotional engagement, resulting in similarities with their TD peers.

School engagement often declines during adolescence, leading to increased school disengagement (Burns et al., 2018; Engels et al., 2021). The results of this study show significant differences between adolescents with ASD and their TD peers, particularly in terms of behavioral and cognitive disengagement. Adolescents with ASD tend to exhibit higher levels of disengagement, which manifest as a greater likelihood of encountering school-related issues, not paying attention in class, and attempting to arrive late or sneak out of classrooms (Wang et al., 2019)

These results are consistent with the findings of Pérez-Salas et al. (2021), who observed that adolescents with SEN, other than ASD, showed higher levels of cognitive and behavioral disengagement compared to their TD peers. According to Pérez-Salas et al. (2023), the administration format of the instrument could influence the dimensions of school disengagement since self-reporting tends to yield higher disengagement scores than an interview format. Therefore, the researcher's presence during the evaluation could have influenced the results obtained, increasing social desirability and decreasing the sincerity of responses when asked about maladaptive behaviors, cognitions, and emotions.

The result of this research shows that both the teacher-student relationship and school participation impact the levels of total school engagement of adolescents with ASD and TD in regular schools. These results are in line with the studies of Lara et al. (2022) and Pérez-Salas et al. (2021), which highlight the influence of the teacher-student relationship and school participation on school engagement in students with SEN, excluding ASD, and with the findings of Losh et al. (2022a) and Roorda et al. (2021), which show that the quality of the teacher-student relationship has a significant impact on the school engagement of students with ASD.

However, the findings also reveal that the teacher-student relationship does not significantly influence any of the four dimensions of school engagement. This result diverges from previous evidence reported by Pérez-Salas et al. (2021) in students with SEN without ASD, who found that positive teacher-student relationships were positively associated with all dimensions of school engagement. This difference could be related to the fact that, although the teacher-student relationships in this study were positive, the characteristics of these bonds could vary. This suggests that each teacher's practices and personal style may impact school engagement to a greater or lesser extent (Lara et al., 2022).

Finally, in relation to school participation, participation in extracurricular activities significantly affected behavioral engagement, while participation in school events positively influenced cognitive engagement. In addition, a positive perception of school participation significantly impacted behavioral, emotional, and social engagement. These results are consistent with the findings of Pérez-Salas et al. (2021), who showed that a greater perception of opportunities for school participation in students with SEN and TD was associated with higher levels in all four dimensions of school engagement. This effect can be explained by the influence of teacher behaviors and attitudes aimed at protecting the well-being of students with ASD. According to Lara et al. (2022), these behaviors foster greater school engagement and contribute to increased participation in school activities.

Limitations

Among the most significant limitations of this study is the type of sampling used, as it could have led to a selection bias in which the adolescents who agreed to participate could have specific characteristics compared to those who did not agree to answer the self-report questionnaire. There was a significant gender imbalance between the groups, with a higher proportion of females in the TD group and a greater representation of males in the ASD group. These differences align with the broader prevalence trends of ASD but may also introduce confounding variables. Moreover, the level of ASD among the participants was not used as a control measure, which could have allowed us to obtain more precise conclusions and explanations of the variables studied according to the level of support required. Students with higher support needs may have reported lower levels of school participation and more difficulties in the teacher-student relationship. Future research should consider including ASD severity as a control variable to better understand how different levels of support influence school engagement and participation. It should also aim to include more balanced and representative samples.

Furthermore, the reliance on self-reports in this study may have introduced bias, as students' responses could be influenced by factors such as social desirability. Future re-

search should incorporate teacher and parent perspectives and observational data to provide a more comprehensive understanding of school engagement. It is important to note that the findings of this study may not be generalizable to other educational contexts. Future research could examine how these associations vary across different educational contexts, including schools without inclusive education programs and rural schools, where students with ASD may encounter various challenges and support structures. Understanding these variations will help refine educational policies and strategies to foster school participation and engagement for all students.

Implications for Practice

Given these results, several practical implications arise for educators and school administrators. Schools should actively promote policies and strategies that strengthen teacher-student relationships and encourage meaningful participation in school life for students with ASD to promote higher school engagement. Some key strategies include:

- *Creation of instances of participation in decision-making:* Involve students in developing rules, planning school activities, and designing educational projects to strengthen their sense of belonging.
- *Development of student leadership programs*: Encourage participation in student councils, peer mentoring, and volunteer activities to empower adolescents and strengthen their connection to the school community.
- *Flexible and Inclusive Participation Opportunities*: Schools should design extracurricular activities and events that accommodate a range of interests and sensory needs, ensuring that students with ASD have accessible opportunities to engage in ways that align with their strengths and preferences.
- *Strategies to improve teacher-student relationships:* Implement spaces for individualized dialogue between teachers and students to identify needs, establish academic goals, and provide socioemotional support. Provide specific and encouraging feedback on students' performance, highlighting their strengths and fostering a growth mindset.
- *Teacher Training on ASD*: Providing professional development opportunities for teachers to enhance their understanding of ASD and effective instructional strategies.

CONCLUSION

In conclusion, this study reveals that both teacher-student relationships and school participation significantly influence school engagement, with participation in events and extracurricular activities and a positive perception of engagement being the strongest predictors. These findings underscore the importance of intervening to improve school engagement, especially in adolescents with ASD, and encourage the development of inclusive pedagogical strategies that promote the retention and success of all students in regular settings, regardless of their individual needs and characteristics (Ambrose et al., 2022; Howells et al., 2020).

Considering these findings, policymakers should consider implementing inclusive education policies that emphasize enhancing teacher-student relationships and promoting school participation as key strategies for improving school engagement. This includes developing professional training programs for educators focused on inclusive pedagogical practices, social-emotional learning, and specialized instruction to better support students with ASD. Additionally, schools should adopt policies that ensure equitable access to extracurricular activities and student leadership opportunities, creating structured support systems that encourage meaningful participation for all students. Establishing clear guidelines for fostering a culture of belonging and participation, alongside allocating resources for specialized support staff and adaptive learning environments, can further strengthen inclusive education practices.

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DECLARATION OF INTEREST

The authors reported no potential conflict of interest.

ETHICS DECLARATION

The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics, Bioetics and Biosafety Committee of Universidad de Concepción (CEBB 1525-2023) on September, 2023.

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