

ORIGINAL ARTICLE

Patterns of sport participation for youth with autism spectrum disorder and intellectual disability

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Background: Little is known about sport participation in youth with Autism Spectrum Disorder (ASD). The current study examined sport characteristics (frequency, diversity, positive social experiences [PSE]) for youth with ASD and intellectual disability compared to youth with intellectual disability alone and explored the personal and contextual correlates of involvement.

Method: Parents ($N = 409$) completed an online survey, and multiple mediation analyses were used to examine the factors that explained the relationships between sport involvement in youth with ASD and intellectual disability.

Results: No significant main effects of ASD status were found for frequency or diversity, but youth with intellectual disability alone had higher scores for PSE compared to youth with ASD and intellectual disability. Sociocommunicative abilities, coach relationship and resources mediated the relationship between ASD status and PSE.

Conclusions: A better understanding of the factors related to sport is essential for allowing families, service providers and policy makers to improve involvement for youth with ASD.

KEYWORDS

autism spectrum disorder, contextual factors, intellectual disability, personal factors, sport participation

1 | INTRODUCTION

Sport involvement constitutes an important area of community inclusion and physical activity for people with disabilities, including for people with autism spectrum disorder (ASD) and with intellectual disabilities. ASD is characterized by impairments in social interaction and communication skills, as well as restricted and repetitive patterns of interests and behaviours (APA, 2013). Approximately 56% of youth with ASD are thought to also have an intellectual disability (intellectual disability; $IQ \leq 70$) or be of borderline intellectual functioning (71–85) (Christensen et al., 2016). Along with these difficulties, youth with ASD and intellectual disability struggle with emotional and behavioural problems. Totsika, Hastings, Emerson, Lancaster, and Berridge (2011) reported that the majority of youth with ASD and intellectual disability

have emotional (71%) and behavioural problems (65%–88%), compared to youth with intellectual disability alone (emotional problems—42%; behavioural problems—46%–63%). Similarly, youth with ASD and with intellectual disability are more likely to have physical comorbidities than the general population (Bebbington, Glasson, Bourke, de Klerk, & Leonard, 2013; Matson & Goldin, 2013; Thomas, Hovinga, Rai, & Lee, 2017). Youth with intellectual disability alone have lower sport participation rates than their typically developing peers (Solish, Perry, & Minnes, 2010; Westendorp, Houwen, Hartman, & Visscher, 2011), and youth with both ASD and intellectual disability have lower sport participation rates compared to youth with other disabilities, including emotional, developmental, physical/motor or behavioural problems (27% for ASD versus 41% for other disabilities; Blanchard, Gurka, & Blackman, 2006) and to typically developing peers (27% for

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ASD versus 77% for peers; Potvin, Snider, Prelock, Kehayia, & Wood-Dauphinee, 2013; Healy, Haegele, Grenier, & Garcia, 2017). Given that youth with ASD show a decline in physical activity with age and may be at risk for health problems due to physical inactivity (Pan & Frey, 2006), greater research into the personal and contextual correlates of sport involvement is needed (Grandisson, Tétreault, & Freeman, 2012). Personal factors reflect an individual's "intrinsic characteristics" while contextual factors represent the "physical or social" components of an individual's environment (Grandisson et al., 2012). The current study sought to identify the associations of sport involvement characteristics in youth with both ASD and intellectual disability and youth with intellectual disability alone. Characteristics of sport involvement were operationalized through frequency (e.g., how often an individual participates), diversity (e.g., number of sports involved in) and positive social experiences while in sport (e.g., learned to work with others in a group, made a new friend; Eime, Young, Harvey, Charity, & Payne, 2013; Holt, Kingsley, Tink, & Scherer, 2011).

There are many personal factors that may have an impact on sport involvement. Age is negatively associated with physical activity in youth with ASD (Memari et al., 2012) and with intellectual disability (Robertson & Emerson, 2010), akin to what is reported in the general population (Levinson & Reid, 1991). In youth with and without disabilities, males are more physically active than females (Frey, Stanish, & Temple, 2008; Lorenzi, Horvat, & Pellegrini, 2000; Robertson & Emerson, 2010), and this may translate to their degree of involvement more broadly. For instance, male athletes with intellectual disability in Special Olympics are more likely to be involved in team sports that require many athletes and a high degree of physical exertion than are female athletes with intellectual disability (Gillespie, 2009). For youth with ASD and intellectual disability, it is particularly relevant to consider how social communicative and practical components of adaptive behaviour can influence involvement in sport (Buttimer & Tierney, 2005; Grandisson et al., 2012), given the greater impairments in these domains compared to the general population (American Psychiatric Association, 2013), and that limited social communication abilities can hinder participation in sport through negatively impacting interactions with peers or coaches (Ferguson & Shapiro, 2016). Similarly, the presence of maladaptive behaviour, such as self-injury or aggression, can further limit participation in social sport activities that have a significant emphasis on group work and team building (LaFontana & Cillessen, 2002).

There are several contextual factors that could have an impact on sport involvement and may be even more important to consider than personal characteristics (Coster et al., 2012). The availability and adequacy of resources, such as finances or equipment, are instrumental to facilitating participation in home, school and community activities, including in sports (Coster et al., 2012; Pan & Frey, 2005). Youth with ASD and with intellectual disability often require considerable supports and adaptations to the environment to enable meaningful inclusion (Darcy & Dowse, 2013), such as ensuring sufficient ratio of support staff to meet individualized needs, promoting inclusion within teams and activities, and providing appropriate activities for varying ability levels. Parent and coach support may also represent a set of

contextual influencers on sport involvement, as strong social networks have been found to contribute to sport participation for individuals with intellectual disability (Robertson & Emerson, 2010). In youth without disabilities, parents' attendance at games and support for sport, including providing transportation and playing with the child outside of sport, can positively affect child motivation (Keegan, Spray, Harwood, & Lavalley, 2010) and thus result in an increased frequency of sport participation (Alexandris, Tsohatzoudis, & Grouios, 2002). Similarly, a positive coach-athlete relationship is a consistent predictor of positive athlete development in youth without disabilities (Vella, Oades, & Crowe, 2013). To date, no study has examined how contextual variables relate to sport involvement in youth with both ASD and intellectual disability.

More research is needed to understand how personal and contextual variables impact sport involvement for youth with ASD and intellectual disability. Special Olympics (SO) is the largest multisport organization for individuals with intellectual disability in the world and thus serves as an ideal organization for studying characteristics of sport involvement. Considerable research has examined SO participation and related outcomes in youth with intellectual disability (e.g., Gillespie, 2009; Grandisson et al., 2012; McConkey, Dowling, Hassan, & Menke, 2013; Weiss & Bebko, 2008), though none on different characteristics of involvement (i.e., frequency, diversity and positive social experiences) in SO for youth with both ASD and intellectual disability, despite such youths' participation as athletes in the organization (Harada, Siperstein, Parker, & Lenox, 2011; Hutzler, Oz, & Barak, 2013).

1.1 | The current study

The purpose of the current study was to compare characteristics of sport involvement (frequency, diversity, positive social experiences) in athletes with ASD and intellectual disability compared to athletes with intellectual disability alone. We hypothesized that youth with both ASD and intellectual disability would show less frequent, diverse and social involvement compared to a comparison group of athletes without ASD. We also explored the personal and contextual correlates of such involvement, and whether these variables would explain why youth with ASD and intellectual disability would be less involved than their peers. We expected that personal (i.e., age, gender, socio-communicative and adaptive behaviour) and contextual variables (i.e., resources, parent attendance and parent and coach support) would be related to sport involvement for both youth with ASD and intellectual disability and with intellectual disability alone and that differences in these variables would explain lower level of sport involvement in youth with ASD.

2 | METHODS

2.1 | Participants

A total of 409 parents of individuals with intellectual disability involved in Special Olympics (SO) Ontario completed an online

survey (a response rate of approximately 15%). All athletes were required to be registered in SO Ontario in the 2011–2012 season and had a parent-reported clinical diagnosis of intellectual disability or a diagnosis associated with intellectual disability (e.g., Down Syndrome), by a licensed health professional. Parents also reported on whether their child in SO had any additional clinical diagnoses, including ASD (29.4%, $n = 120$). Although a reporting bias is possible when using parent reports, other studies have used similar processes for verifying developmental disability with parent-report surveys (e.g., Totsika et al., 2011; Weiss & Burnham Riosa, 2015). All athletes were between 11 and 23 years of age at the start of the study. As shown in Table 1, athletes were on average 17 years of age ($SD = 3.05$) and 64% were male ($n = 261$). Parents reported on child cognitive ability by responding to a question about how well their child could independently complete four tasks (e.g., read and understand common signs) using a 4-point Likert scale (0 = *Not well at all* to 3 = *Very well*). This scale was originally used in a national study of adolescents who received special education services in the US (National Longitudinal Transition Study–2; NLTS2) and has been used with parents of individuals with ASD (Mazurek, Shattuck, Wagner, & Cooper, 2012; Weiss & Burnham Riosa, 2015). Athletes had an average score of 1.36 ($SD = 0.81$), with no difference between youth with ASD and intellectual disability and those with intellectual disability alone. More males ($n = 94$) were reported to have a diagnosis of ASD than females ($n = 26$; $p < .001$), but no other demographic differences between groups were noted. On average, parents were approximately 49 years of age ($SD = 6.10$), with 81% ($n = 331$) being mothers.

2.2 | Measures

2.2.1 | Characteristics of sport involvement

Frequency

The frequency of sport involvement was rated by parents for the past 12 months, on a 6-point response scale (1 = *Never* to 6 = *Several times a week*). The frequency scale was adapted from the 4-H Study, a project which aimed to understand healthy development in youth

(Lerner et al., 2005). The scale has been previously used in a study of thriving in SO athletes (Weiss & Burnham Riosa, 2015).

Diversity

Parents also reported on the total number of sports that their child participated in over the past 12 months (sport diversity), which ranged from 0 to 9 sports in the full sample ($M = 2.21$, $SD = 1.54$). Similar frequency and diversity questions have been used in a recent study in youth with ASD (Healy et al., 2017).

Positive social experiences

Positive social experiences in sport were measured using social items from a laboratory-developed measure adapted from the Youth Experiences Survey (YES 2.0; Hansen & Larson, 2005), called the Youth Experience Survey—Special Olympics edition (YES-SO). The YES-SO is comprised of 12 items that describe youths' perceived gains from participation in Special Olympics; seven of which enquire specifically about social gains: learned to work with others in a group, learned about helping others, became more connected with our community, has improved relationships with adults, had the opportunity to act as a leader, better at receiving feedback and made a new friend. Parents rated how much they agreed to each statement using a 4-point Likert scale (0 = *Not at all* to 3 = *Yes definitely*), with an average social sport experience score of 1.68 ($SD = 0.77$; ranging from 0 to 3). In the overall sample, the social subscale had excellent internal consistency (Cronbach $\alpha = .91$) and strong intraclass correlations (single measures = 0.58, average measures = 0.91). Other studies of children with ASD have used similar parent-report methods for assessing children's engagement in community activities (e.g., Ehrmann, Aeschleman, & Svanum, 1995; Wong, Lam, Leung, Ho, & Au-Yeung, 2014).

2.2.2 | Personal factors

Social communication abilities

Social ability was assessed using a brief social scale employed in other studies with parents of individuals with ASD (Mazurek et al., 2012) and originally taken from the NLTS-2. Parents responded to four items about social situations (e.g., How often does your child seem confident

TABLE 1 Comparisons of demographic variables in youth with ASD and intellectual disability

Variables	M (SD)/%			t test/ χ^2 (df)
	Full sample (N = 409)	ASD + intellectual disability (N = 120)	Intellectual disability alone (N = 289)	
Parent age	49.39 (6.14)	49.63 (5.74)	49.34 (6.26)	-.44 (387)
Child age	17.20 (3.05)	16.88 (3.27)	17.35 (2.95)	1.40 (407)
Child gender (males)	63.8%	78.3%	57.8%	15.51 (409)***
Cognitive ability	1.36 (.81)	1.47 (.87)	1.32 (.79)	-1.66 (404)
Time in SO (years)	5.01 (3.50)	4.63 (3.22)	5.16 (3.60)	1.34 (385)

*** $p < .001$.

in social situations), using a 4-point Likert scale (0 = *Never* to 3 = *Very often*). Communication ability was assessed using 3 items (e.g., uses spoken language; based on a one-item language scale by Mazurek et al., 2012) with a 4-point Likert scale (1 = *Cannot do at all* to 4 = *Has no trouble*). The social and communication items were combined to reflect the ASD characteristic of sociocommunicative impairments, with higher scores indicating a greater degree of sociocommunicative competence (range = 0.29–3, *Median* = 1.71, *M* = 1.71, *SD* = 0.63) in the full sample, with an internal consistency of $\alpha = .84$ for the current study.

Daily living skills

The Waisman Activities of Daily Living Scale was used as a measure of the level of independence an individual with developmental disabilities (including ASD) has in typical daily activities (e.g., grooming) (Maenner et al., 2012). Parents completed 17 items about their child's ability to complete a task for a range of activities, each on a 3-point scale (0 = *Does not do at all* to 2 = *Independent or does on own*). Reports of daily living skills ranged from 0 to 34, with a mean of 20.95 (*SD* = 6.29) and an internal consistency of $\alpha = .91$ in the current study.

Behaviour problems

The Strengths and Difficulties Questionnaire (Goodman, 1997) was used as a measure of behavioural problems and has been used in other studies of individuals with ASD (e.g., Findon et al., 2016). Parents were asked to answer each question about their child based on the previous 6 months or the last school year using a 3-point Likert scale (0 = *Not true* to 2 = *Certainly true*). The 25 items are divided into five subscales, with five items in each. For the purposes of the study, only the subscales relating to behaviour were included as follows: Hyperactivity (e.g., "constantly fidgeting or squirming") and Conduct Problems (e.g., "often lies or cheats"). Severity of conduct problems ranged from 0 to 7, with a mean score of 1.57 (*SD* = 1.62) and an internal consistency of $\alpha = .62$, while the severity of hyperactivity ranged from 0 to 10, with a mean score of 5.00 (*SD* = 2.44) and an internal consistency of $\alpha = .76$.

2.2.3 | Contextual factors

Adequacy and availability of resources

The Participation and Environment Measure for Children and Youth (PEM-CY; Coster et al., 2012) was developed to measure involvement and associated environmental factors of youth with disabilities (including children with intellectual disability and with ASD). The current study used the environmental questions to measure the adequacy and availability of environmental resources and support for SO. Parents responded to a question about whether certain factors were available and/or adequate to support their child's participation in SO (seven items; e.g., access to transportation, enough time/money) using a 4-point scale (1 = *Not needed* to 4 = *Usually no*). Parents were also asked a question about whether certain factors help or make it harder for their child to participate in SO (nine items; e.g., physical layout, cognitive demands), using a 4-point scale (1 = *Not an issue* to 4 = *Usually makes harder*). A total score was obtained by summing the 16 items, with higher scores

reflecting a higher quality and availability of environmental resources. Reports on the child's resources ranged from 30 to 48, with a mean score of 43.27 (*SD* = 4.17) and an internal consistency of $\alpha = .77$.

Coach relationship

To assess the youth's relationship with their coach(es), parents were asked to rate how much they agree with four statements (e.g., child likes coach(es)) using a 7-item Likert scale (1 = *Strongly disagree* to 7 = *Strongly agree*). The scores in the current study ranged from 4 to 28 for the child's relationship with their coach(es), with a mean score of 18.69 (*SD* = 4.27) and an internal consistency of $\alpha = .64$. Similar methods of assessing the coach-athlete relationship have been used in the general sport literature (e.g., Barnett, Smoll, & Smith, 1992).

Parent attendance and instrumental support

Attendance and instrumental support were measured separately. Parents and caregivers reported on their own attendance at practices, with five response options (0 = *Never*, 1 = *Up to 25% of the time*, 2 = *25%–50%*, 3 = *51%–75%*, 4 = *76%–100% of the time*). The scale had a mean score of 3.16 (*SD* = 1.31). Parents also described how often they provided instrumental support for their child's participation in sport (five items; e.g., play with child in sport, provide transportation) on a 5-point response scale (0 = *Never* to 4 = *Daily*), with a mean score of 10.26 (*SD* = 4.64) and an internal consistency of $\alpha = .80$. Other studies of youth with ASD have used comparable parent-report methods for examining parent involvement in their child's activities or programme (Solish & Perry, 2008).

2.3 | Procedure

The present study was part of a larger study of SO athletes and their families. The parents and caregivers of every SO Ontario athlete registered between the ages of 11 and 23 years in 2012 (*N* = 2,800) were contacted via SO Ontario mailing lists and local SO organizations and invited to participate in a paper and pencil or online survey about SO involvement. A modified approach to the Dillman recruitment method (2000) was used, which consisted of contacting participants via mailing postcards, letters and sending email reminders about the survey. Parents gave informed consent to take part in the research before starting the survey.

2.4 | Data analysis

The participants were divided into two groups based on diagnoses (i.e., ASD/intellectual disability or intellectual disability alone). To address the first objective, and as a result of different rates of males and females in the two groups, three ANCOVAs were conducted to test for significant differences in characteristics of sport involvement for youth with ASD and intellectual disability compared to youth with intellectual disability alone, after controlling for gender. Second, if the prior analysis determined that there was a difference between groups, regression analyses using the PROCESS macro (Hayes, 2012) were conducted to determine whether the personal and contextual factors (age, sociocommunicative and adaptive behaviour, resources, parent

attendance and parent and coach support) mediated the relationship between ASD status and characteristics of sport involvement. Preacher and Hayes' (2008) bootstrapping procedure (1,000 bootstrap samples) generated 95% confidence intervals, which were used to test the indirect effects of the mediation model. Confidence intervals that did not include zero indicated a significant mediator within the model. If ASD status was not related to the characteristic of sport involvement, then standard regressions were calculated to identify significant personal and contextual predictors.

3 | RESULTS

Due to significant skewness values ($p < .001$), the daily living skills and coach relationship variables were transformed using a square root transformation. The problem behaviour—conduct problems and resources variables each had two univariate outliers that exceeded the possible range of critical z -scores ($z > 3.29$, $p < .001$); therefore, these cases were not included in further analyses. As shown in Table 2, many of the factors were related to one another, with the bivariate correlations all within the acceptable range for collinearity and able to be included in multivariate analyses (Tabachnick & Fidell, 2007).

3.1 | Characteristics of sport involvement for youth with ASD and intellectual disability compared to youth with intellectual disability alone

There were no significant main effects of ASD status for sport frequency, $F(1, 404) = 0.35$, $p = .55$ or diversity, $F(1, 406) = 0.22$, $p = .64$. The covariate of gender was significantly related to sport diversity, $F(1, 406) = 5.75$, $p = .02$. A third ANCOVA for positive social experiences showed that although gender was not a significant covariate, there was a significant main effect of ASD status, $F(1, 393) = 10.23$, $p = .001$, with youth with intellectual disability alone having higher

scores for social sport experiences compared to youth with ASD and intellectual disability, $t(396) = 3.20$, $p = .001$.

3.2 | Predictors of characteristics of sport involvement

Multiple regression analyses were performed to identify correlates of characteristics of sport involvement, separately for youth with ASD and intellectual disability, and intellectual disability alone, with all personal and contextual factors entered in the model. There were three significant predictors of sport frequency for youth with ASD and intellectual disability: child age, $\beta = .18$, $p = .03$, coach–athlete relationship, $\beta = .47$, $p < .001$ and parents' attendance at practices, $\beta = .23$, $p = .01$, in an overall model that accounted for 41% adjusted variance, $F(10, 84) = 7.43$, $p < .001$. For youth with intellectual disability alone, availability and adequacy of resources, $\beta = .16$, $p = .01$, coach–athlete relationship, $\beta = .30$, $p < .001$ and parents' attendance at practices, $\beta = .20$, $p = .001$, together accounted for 26% adjusted variance, $F(10, 213) = 8.95$, $p < .001$.

A second set of regression analyses were used to examine sport diversity for youth with ASD and intellectual disability, and intellectual disability alone, including all personal and contextual factors. For youth with ASD and intellectual disability, there were three significant predictors of sport diversity: Coach–athlete relationship, $\beta = .23$, $p = .02$, parents' attendance at practices, $\beta = .25$, $p = .02$ and parents' instrumental support of sport, $\beta = .22$, $p = .03$, accounting for 19% of the variance, $F(10, 86) = 3.30$, $p = .001$. For youth with intellectual disability alone, only the coach–athlete relationship predicted sport diversity, $\beta = .23$, $p = .001$, accounting for 7% adjusted variance, $F(10, 213) = 2.71$, $p = .004$.

A multiple mediation analysis was then calculated to test whether personal and contextual variables explained the difference in positive social experiences between youth with ASD and intellectual disability compared to youth with intellectual disability alone. Given the

TABLE 2 Correlation analyses of characteristics of sport participation, personal factors and contextual factors

	Sport diversity	PSE	Sociocomm.	DLS	Hyper.	Conduct	PEMCY	Coach	Attend.	Instr.
Sport frequency	.55***	.40***	.08	.20***	-.13*	-.06	.25***	.40***	.24***	.21***
Sport diversity		.28***	.03	.11*	-.06	.00	.09	.26***	.08	.16**
PSE			.35***	.31***	-.24***	-.18***	.31***	.55***	.09	.24***
Sociocomm.				.38***	-.24***	-.09	.30***	.20***	.07	.15**
DLS					-.30***	-.01	.28***	.12*	-.01	.09
Hyperactivity						.37***	-.21***	-.20***	-.01	-.04
Conduct							-.16**	-.14**	-.00	-.02
PEMCY								.20***	.10*	.03
Coach									.08	.11*
Attendance										.21***

PSE, positive social experiences; Sociocomm, sociocommunication abilities; DLS, daily living skills; Hyper, hyperactivity; Conduct, conduct problems; PEMCY, availability and adequacy of resources; Coach, relationship with coach(es); Attendance, Parent attendance; Instr, Parent instrumental support. $N = 354$ –407.

* $p < .05$ ** $p < .01$ *** $p < .001$.

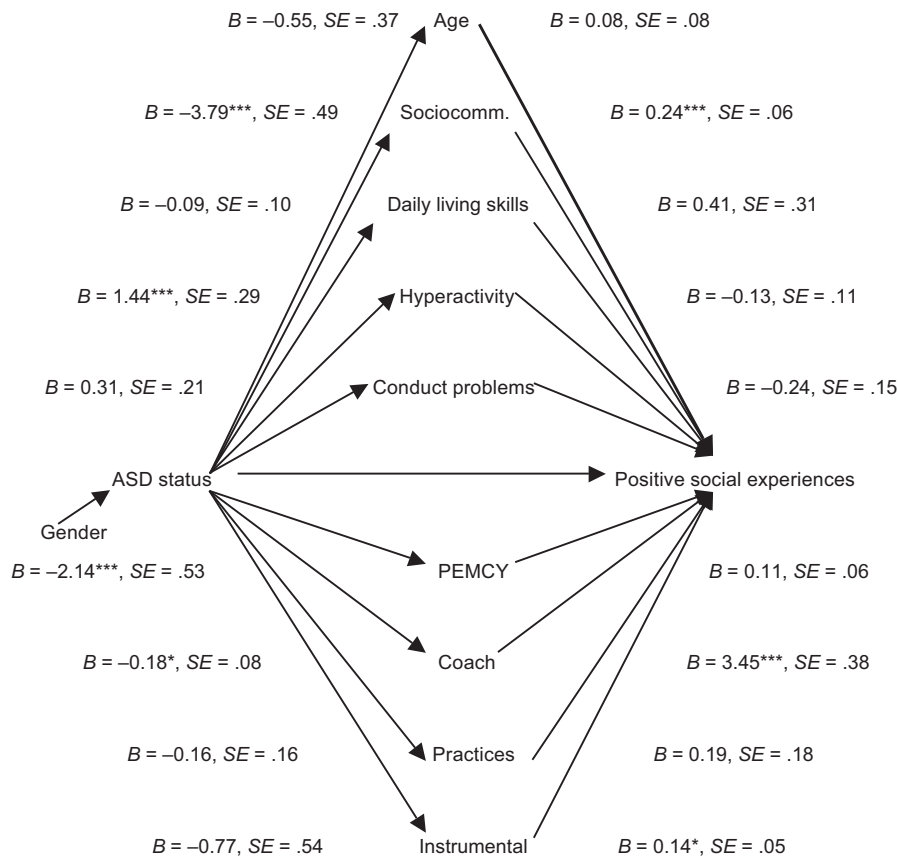


FIGURE 1 Multiple mediation analysis of positive social experiences with personal and contextual mediators operating in parallel ($N = 331$). B, unstandardized regression coefficient; SE, standard error; Sociocomm, sociocommunication abilities; PEMCY, Availability and adequacy of resources; Coach, relationship with coach(es); Practices, Parent attends practices; Instrumental, Parent instrumental support. * $p < .05$ ** $p < .01$ *** $p < .001$

TABLE 3 Total, direct and indirect effects of multiple mediation analysis of positive social experiences (PSE)

	Total and direct effects			
	B	SE	t	p
Total effect of ASD on PSE	-1.70	.63	-2.69	.008
Direct effect of ASD on PSE	0.54	.56	.95	.34
	Bootstrap results for indirect effect			
	Point estimate	SE	95% CI	
Total indirect effect	-2.23	.48	[-3.18, -1.29]	
Age	-.04	.06	[-.24, .02]	
Sociocomm.	-.91	.25	[-1.44, -.44]	
DLS	-.04	.06	[-.26, .03]	
Hyperactivity	-.19	.17	[-.58, .12]	
Conduct	-.07	.08	[-.31, .02]	
PEMCY	-.22	.13	[-.55, -.01]	
Coach	-.63	.27	[-1.19, -.13]	
Practices	-.03	.05	[-.23, .02]	
Instrumental	-.11	.09	[-.34, .02]	

B, unstandardized regression coefficient; SE, standard error; number of bootstrap samples, 1000; CI, confidence interval; Sociocomm, sociocommunication abilities; DLS, daily living skills; Hyper(activity), hyperactivity; Conduct, conduct problems; PEMCY, availability and adequacy of resources; Coach, relationship with coach(es); Practices, parent attends practices; Instrumental, parent instrumental support.

dichotomous coding of gender and the higher ratio of males in the ASD sample, gender was included as a covariate. As shown in Figure 1, ASD status was a significant predictor of sociocommunicative abilities

($p < .001$), hyperactivity ($p < .001$), availability and adequacy of resources ($p < .001$) and coach relationship ($p < .05$). In addition, socio-communicative abilities ($p < .01$), coach-athlete relationship ($p < .001$)

and parent instrumental support ($p < .05$) were significant predictors of social sport experiences. As shown in Table 3, the total effect of ASD status on social sport experiences was significant, $t(332) = -2.69$, $p = .01$. Specific indirect effects indicated that sociocommunicative abilities (indirect effect = $-.91$, $SE = .25$, 95% CI $[-1.44, -.44]$), coach-athlete relationship (indirect effect = $-.63$, $SE = .27$, 95% CI $[-1.19, -.13]$) and availability and adequacy of resources (indirect effect = $-.22$, $SE = .13$, 95% CI $[-.55, -.01]$) mediated the relationship between ASD status and social sport experiences.

4 | DISCUSSION

To our knowledge, this is the first study to investigate characteristics of sport involvement in youth with both ASD and intellectual disability. Although rates of sport participation have been found to be lower in youth with ASD compared to youth with other disabilities (Blanchard et al., 2006) and youth without disabilities (Potvin et al., 2013), we found no group differences for sport frequency (e.g., how often individual participates) or sport diversity (e.g., number of sports involved in) in a sample of youth already participating in sport. One reason may be the unique approach to sport involvement that SO employs to support adaptive behaviours so that individuals with developmental disabilities can be involved. Several factors within SO, such as the availability of practical support and adapted equipment, and the knowledge of coaching staff, are key to scaffolding sport involvement for youth with unique developmental considerations (Grandisson et al., 2012). The findings from the present study suggest that, when supports are in place, youth with ASD and intellectual disability who are involved in SO can participate in as many sports, and as often, as their peers with intellectual disability without ASD.

Parents reported that youth with ASD and intellectual disability had fewer positive social experiences in sport compared to youth with intellectual disability alone. While the tailored supports of SO may be helpful in ensuring that youth with ASD and intellectual disability can participate, the accommodations may not bridge the gap when it comes to benefitting from the same social gains as their peers without ASD. Social deficits are a core characteristic among individuals with ASD, including impaired social communication skills and a poor understanding of social norms (American Psychiatric Association, 2013). These types of social challenges can make it difficult for youth with ASD to engage in group settings, as they are less likely to engage with others and may not be as responsive to social bids (Sigman & Ruskin, 1999). Similarly, in the general research literature, sport involvement may not always facilitate positive social experiences. Youth athletes have also reported negative peer interactions, greater stress and higher rates of social exclusion (Hansen, Larson, & Dworkin, 2003; Larson, Hansen, & Moneta, 2006; Wilkes & Côté, 2010). Coaches and parents can consider the potential differences in social experiences for youth with ASD who are involved in sport and facilitate positive integration for those who struggle with the social aspects of team involvement.

The second goal of the current study involved a closer examination of the characteristics of sport involvement by investigating how

they related to personal and contextual variables. Personal factors were not significant predictors of sport frequency or diversity for youth with ASD and intellectual disability or intellectual disability alone, which may reflect the adaptive scaffolding, or supported inclusion, often put in place in SO programming (Grandisson et al., 2012). At the same time, lower sociocommunicative ability was associated with less positive social experiences in sport for youth with ASD and intellectual disability. These findings are in line with previous intellectual disability research, which has shown that positive sport participation and inclusion is moderated by an individual's level of adaptive behaviours (Buttimer & Tierney, 2005; Grandisson et al., 2012). Taking into account the sociocommunicative deficits associated with an ASD diagnosis, it follows that youth with ASD and intellectual disability would have more challenges engaging in team-based activities and benefitting from social experiences than youth with intellectual disability alone, and that this personal characteristic may be particularly relevant for youth with ASD. Future research could examine whether youth with ASD and intellectual disability are more likely to engage in individual or team-based sports, given the core social and communication deficits associated with an ASD diagnosis.

Several contextual factors were predictive of sport involvement, including adequacy and availability of resources, coach-athlete relationship and parent attendance and support. Higher levels of adequate and available resources were related to more frequent sport involvement, after controlling for personal factors, in the group of youth with intellectual disability alone. Broadening investigations of resources to participation beyond the common barriers of scheduling conflicts and lack of transportation (Beart, Hawkins, Kroese, Smithson, & Tolosa, 2001; Darcy & Dowse, 2013), to include physical layout, sensory qualities and social demands, is particularly relevant for youth with developmental disabilities, given the range of deficits in cognitive, social and communication domains.

The coach-athlete relationship was a predictor in both groups for sport frequency and diversity, and a partial mediator for the relationship between ASD status and social sport experiences. The findings from the current study highlight the importance of the relationship between youth and their coach, such that better relationships are related to a greater range and more frequent involvement in sports, and social sport experiences. Further, youth with intellectual disability alone (particularly males) had better social sport experiences than youth with ASD and intellectual disability, which may be due to their respective relationships with coaches. Particularly for youth with ASD and intellectual disability who struggle with social and behavioural challenges, having a coach who is able to provide appropriate support is critical for maintaining active involvement and ensuring that youth have similar positive social experiences to their peers.

Parental attendance and instrumental support of sport were predictive of sport frequency and diversity in both groups. Parent instrumental support was also found to be a predictor of social sport experiences. These findings draw attention to the value of parent support for youth engagement in sport. Many researchers within the ASD field support the notion that parents are the most valuable and effective factor for promoting positive changes in a child's well-being

and behaviour (McAleese, Lavery, & Dyer, 2014; Panerai, Ferrante, & Zingale, 2002). Parent attendance at sport practices may have a positive influence on how many sports a child with ASD is involved with, and how often they are involved in sporting practices and events. This relationship may also be bi-directional, with greater parent attendance related to the number of sports in which a child participates.

4.1 | Limitations

There are a number of limitations to this research. Despite certain advantages associated with survey-based research, such as cost and efficiency, there remains a potential for a response and sample bias. Like most survey research in the field of developmental disabilities, the current study relied solely on parent report, with mothers being the majority of responders (80%), and results may not be generalizable to all family situations. Similarly, given the low number of females in the ASD sample (22%) and the increasing knowledge of differing needs in this population (e.g., Foggo & Webster, 2017), the findings may not be representative for all young females with ASD. Alternative data sources, using additional perspectives and measures, would be valuable in future studies to lessen the effect of any shared method variance. Second, the study was cross-sectional in nature and results do not indicate causality or directionality. While adaptive behaviours may lead to improved sport involvement, it is also possible that youth with more social sport experiences develop better behaviours. Similarly, contextual factors, such as parent support and coach-athlete relationship, may improve in youth who have better sport experiences, as caregivers recognize the positive effects of sport on the child and become more motivated to support involvement. Third, although the SO sample offers a valuable opportunity to better understand the factors that contribute to optimized sport involvement, the study is unable to offer insights into enhancing engagement of non-participants, given that the sample is made up of youth with ASD and intellectual disability who already engage in sports.

5 | CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

Taken together, the current study offers important implications for community sport settings, as well as for future research on sport involvement for youth with ASD. A better understanding of the factors related to sport is essential for allowing families, service providers and policy makers to improve sport involvement for youth with ASD. Athletes with ASD and intellectual disability do not differ in sport frequency or diversity compared to athletes with intellectual disability alone, supporting the notion that adapted physical activity programme for athletes with intellectual disability also enable athletes with ASD and intellectual disability to participate. At the same time, youth with ASD and intellectual disability did have fewer positive social experiences in sport compared to youth with intellectual disability alone. These findings are concerning, as youth with ASD are not gaining the same beneficial sport experiences as their peers, despite similar

diversity and frequency of involvement. Greater understanding of the distinction between the frequency and the quality of sport experiences is needed in future sport research for youth with ASD and intellectual disability.

Contextual factors were predictive of sport frequency and diversity, while both personal and contextual factors were predictive of social sport experiences. These results are encouraging, as they provide several areas for intervention to improve sport involvement and social experiences for youth with ASD and intellectual disability. Providing adequate support in sport for individuals who lack socio-communicative skills may allow youth to participate more regularly or try sports that are new and challenging. Further, improving access to necessary resources, such as support staff for teams and logistical supports, may encourage more regular participation by youth with ASD and intellectual disability. Future research is needed on additional factors that may influence sport experiences and on the beneficial role that sport can play in the lives of individuals with ASD and intellectual disability.

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CONFLICT OF INTEREST

The authors have indicated they have no potential conflict of interests to disclose.

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