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Physical activity enjoyment, perceived barriers, and beliefs among adolescents with and without intellectual disabilities

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Abstract

Background—Youth with intellectual disabilities (ID) exhibit low levels of physical activity, but the underlying contributors to behavior are unclear. We compared physical activity enjoyment, perceived barriers, beliefs, and self-efficacy among adolescents with ID and typically developing (TD) adolescents.

Methods—A questionnaire was administered to 38 adolescents with ID (mean age 16.8 years) and 60 TD adolescents (mean age 15.3 years). Of the original 33 questionnaire items, 23 met the test-retest reliability criteria and were included in the group comparisons.

Results—Fewer adolescents with ID reported that they have someone to do physical activity with (64% vs. 93%, $p < 0.001$), and a greater proportion of adolescents with ID perceived that physical activities were too hard to learn (41% vs. 0%, $p < 0.001$). Fewer adolescents with ID believed that physical activity is good for their health (92% vs. 100%, $p = 0.05$). More adolescents with ID reported a dislike of individual physical activities ($p = 0.02$). A large proportion of adolescents with ID (84%) responded that they were good at doing physical activities, but the difference between groups was only of borderline significance. (95% of TD adolescents, $p = 0.06$).

Conclusions—Adolescents shared many of the same perceptions about physical activity, but some important differences between groups were identified.

Despite strong evidence to support the health benefits associated with physical activity, many youth are not sufficiently active.^{1,2} Children and adolescents with intellectual disabilities (ID), a disability characterized by significant limitations in intellectual functioning and adaptive behavior (American Association on Intellectual and Developmental Disabilities), appear to be more susceptible to low physical activity levels

than typically developing (TD) youth (i.e., youth without intellectual disabilities).³ Although the activity patterns of youth with ID have not been thoroughly studied, emerging research suggests that they do not achieve the minimum recommendations and are less active than their TD peers.⁴⁻⁷ As in the general pediatric population, a steady decline in physical activity with age is observed.^{8,9} Adverse health outcomes for youth with ID that have been consistently associated with low physical activity include poor cardiovascular fitness,^{10,11} low muscular strength and endurance,¹² and high prevalence of overweight and obesity.^{10,11,13,14} The underlying causes of low activity levels among youth with ID remain unclear, but a range of personal, social, environmental, and program-related variables likely create obstacles that restrict participation.¹⁵

An understanding of the factors that influence physical activity behavior is essential for developing and improving interventions.¹⁶ The likelihood that an intervention will be effective is increased if the factors known to hinder and/or facilitate participation are directly addressed within the context of the program.¹⁷ To this end, the correlates and determinants of physical activity among TD children have been extensively reviewed and characteristics that consistently influence participation identified.^{16, 18-20} Far fewer efforts have been undertaken to identify the factors that mediate physical activity participation among children with special needs, such as those with ID. Although these factors can vary according to population subgroups,²¹ research to determine whether or not the physical activity correlates identified for TD youth are also relevant to adolescents with ID may be a useful step toward developing interventions. It may be especially relevant to compare the correlates among these groups of youth in light of the known differences in physical activity levels.⁴⁻⁷

Emerging research to date^{4, 22-25} indicates that child and caregiver preferences for physical activity and caregiver educational level are positively related to physical activity participation among children with ID. Barriers to participation have included lack of accessible programs, child's lack of interest, physical/motor challenges, behavioral difficulties, insufficient time, no location at which to do it, and transportation challenges. Some of these reported barriers are clearly unique to youth with ID and are not as relevant to TD youth, which limits comparisons between these groups. While it may seem reasonable to assume that youth with ID would experience additional challenges to physical activity participation compared to their TD peers, this has not been well established. The extent to which the factors associated with participation are shared or different between TD youth and those with ID will help to determine the need for specially tailored interventions for adolescents with ID and/or the appropriateness of existing programs for inclusion.

Notably, proxy reporting by a parent or caregiver has been the primary means of gathering information about the personal, environmental, and social factors that influence physical activity in youth with ID.^{4, 22, 24-26} Given that proxy reporting may not accurately represent the perceptions and feelings of adolescents with ID themselves,²⁷ an important step toward understanding potential physical activity correlates is to query them directly. The objective of this study was to assess physical activity enjoyment, perceived barriers, beliefs, and self-efficacy among adolescents with ID through direct reporting, and to determine whether these factors differ from TD adolescents. Considering the known disparities in physical activity participation between youth with ID and TD youth, we expected that adolescents with ID

would report more barriers to physical activity, lower enjoyment, and lower self-efficacy for physical activity.

Methods

Participant Recruitment and Enrollment

Adolescents with ID ages 13-21 and TD adolescents ages 13-18 participated in the study. The age limit was slightly higher in the ID group because youth with disabilities are permitted to remain in school until they turn 22 years of age, and our inclusion criteria required that participants be enrolled in school. Informed consent was obtained from a parent and from adolescents aged 18 who were under their own guardianship. Adolescents aged 18 or those who were under a parent's guardianship indicated their willingness to participate by signing an assent form. Consent and assent forms used simple explanations and were read aloud to the adolescents in the presence of a parent. Participants were required to be in good health and were excluded from participating if they had any of the following: chronic illness such as heart disease or cancer that prevented them from participating in gym class at school (because of limitations in performing aerobic activity or lifting 10 pounds or more); developmental disability other than ID (including an autism spectrum disorder); physical disability such as cerebral palsy, spina bifida, or muscular dystrophy; schizophrenia or psychosis; and an acute or chronic injury at the time of screening that would limit typical physical activity. Adolescents were required to be verbally communicative and to reside at home with a parent. The study protocol and materials were approved by the [removed for review] Institutional Review Board.

Adolescents with ID throughout Massachusetts and Rhode Island were recruited from several sources, including schools for children with ID, disability service agencies, community organizations, Special Olympics, special education parent advisory councils, Craigslist™, newspapers, and from an in-house database of participants from previous studies. TD adolescents were recruited through many of these same outlets as well as general community-based agencies and organizations. Recruitment was monitored to ensure that the ID and TD groups were generally balanced by age and sex.

The screening and enrollment protocol involved an initial telephone interview with a parent to determine the eligibility of the adolescent to participate in the study followed by a 1-2 hour study visit. Adolescents with ID completed the Kaufman Brief Intelligence Test, 2nd edition (KBIT-2) to ensure that they met the criterion for ID, defined as a composite score of 75 or below. The KBIT-2 is a brief test that measures verbal and non-verbal ability²⁹ and scores are highly correlated with the Wechsler Adult Intelligence Scale-Revised.³⁰ Parents of adolescents with ID also completed the Vineland Adaptive Behavior Scales II (VABS-II) to assess their child's level of adaptive functioning.³¹ The VABS-II was used to characterize participants with ID in this study. Twenty nine participants were determined to be ineligible for participation either during the phone screen or at the enrollment visit. The most common reasons for ineligibility were that the adolescent: did not have an ID; had a physical disability; was outside of the age range; or was nonverbal. No adolescents were excluded for a chronic disease or medical condition.

Measure

A questionnaire was used to gather information directly from adolescents about factors that may influence their physical activity participation. A validated instrument to measure physical activity correlates among youth with ID has not been developed; therefore, items and constructs found in existing questionnaires and the scientific literature were used.³²⁻³⁶ Social Cognitive Theory³⁷ and the social-ecological model^{38,39} guided the selection of specific items for the questionnaire which addressed physical activity enjoyment, perceived barriers, beliefs, and generalized self-efficacy. Our multidisciplinary research team used its extensive experience and knowledge with this population to modify and refine questions to ensure clarity for adolescents with ID. Since “physical activity” is a broad and relatively abstract term that may be difficult for adolescents with ID to conceptualize, the phrase “sports and exercise” was used. The questionnaire comprised close-ended questions and was designed to be administered as a structured interview with questions being read out loud to participants and response choices recorded by the interviewer. Considering the cognitive limitations associated with ID, the questionnaire was developed to be easily answerable without relying on an adolescent's ability to interpret and/or communicate abstract concepts. As such, we opted for close-ended questions and simple forced-response choices to make it easier for adolescents with ID to report their answers. Since the study aimed to compare adolescents with ID and TD adolescents, the items included on the questionnaire were those that were relevant to both groups.

The questionnaire included 33 items. Of those, 9 items targeted physical activity enjoyment and preferences for where and with whom they participate. Examples of these questions include: “How much do you like to go for a walk?” and “How much do you like participating in gym class at school?” There were 3 questions on enjoyment of non-physical activities: watching television and playing video games, reading, and arts & crafts. Twelve questions targeted perceived personal, social, and environmental barriers to physical activity such as: “Are you ever too busy to do sports and exercise?”; “Are you ever afraid of getting hurt doing sports and exercise?”; “Do you think that sports and exercise are too hard to learn?”; and “Do you think it is ever too hot or cold to do sports and exercise?” As noted, although adolescents with ID may experience unique barriers to participation directly associated with their disability, the questionnaire addressed barriers that were relevant to both adolescents with ID and TD adolescents in order to be able to make comparisons between the groups. The perceived barrier questions were two-tiered. The first part of the question asked, for example: “Are you ever bothered by how you look when you're doing sports and exercise?” or “Do you ever think that sports and exercise are boring?” When a participant responded “Yes” to the first question, they were asked a second, follow-up question: “Does that stop you from participating a lot?” This two-tiered approach allowed us to distinguish whether a factor such as being “bothered by how you look” actually hindered participation in physical activity, or if it was simply acknowledged by an adolescent but did not influence their behavior. Two questions asked about whether participants had a pet (considered a facilitator of physical activity), and whether they walked, biked, ran, or played catch with their pet. Four questions targeted beliefs about physical activity. Examples of these questions included: “Do you think sports and exercise are good for you?” and “Do you think that doing sports and exercise is a way to make new friends?” The final three questions

addressed generalized self-efficacy; for example: “How good are you at doing sports and exercise?” The maximum number of response choices for each question was limited to three and included simple, concrete options such as, “Yes” and “No” (for barriers questions); “Like it”, “It's okay”, and “Don't like it” (for preference and enjoyment questions); and “Very good”, “Okay”, and “Not good” (for self-efficacy questions).

Prior to data collection, the questionnaire was pilot-tested with four adolescents with ID and six TD adolescents to verify the clarity of all questions and to test the interview procedures. Participants were asked for their feedback on the questionnaire and were debriefed to assess whether any of the instructions, questions, or response choices were unclear or hard to answer. The wording of questions and instructions were refined based on this pilot test, and two items were removed: “How much do you like doing puzzles, playing board or card games?”, and “Do people ever make fun of you when you do sports and exercise?”.

Procedure

The interview was administered by a trained research assistant on a one-on-one basis in a private room and took 15-20 minutes to complete. In an effort to expand our recruitment pool of adolescents with ID and to facilitate their participation, we travelled to more than 10 different urban and suburban communities throughout Massachusetts and in one community in Rhode Island to conduct interviews at libraries and community centers. Participants were compensated for their involvement in the study with a gift card. All procedures, including the instructions to participants, were standardized and care was taken not to provide feedback or to lead participants toward a given response. Visual materials were used to assist with the interviews, if needed. For a subset of questions, a card with the printed response choices gave participants the option of pointing to their selection in text rather than verbalizing it. Participants could also refer to the card if they needed a reminder of the response choices. In addition to the printed text, some response choices included a corresponding symbol (e.g., smiling face to indicate “Like it”) to clarify the option. If it was judged that a participant failed to understand the intended meaning of a question, then the interviewer marked the response as invalid. Observable behaviors and cues during the interview were used to assist in making this judgment, such as: an unusually long pause before responding, a rapid response before a complete question was asked, high distraction or inattention while a question was asked, and/or repeatedly responding “I don't know” when a question was repeated. Any response that was marked as invalid by the interviewer was excluded from further analysis. If more than 20% of the responses (i.e., 7 of the 33 questions) were marked as invalid for a given participant, the entire interview was excluded from analysis.

Test-retest reliability of the questionnaire was assessed by comparing the responses from a subset of participants (n=14 with ID; n=20 TD) who repeated the interview within 14-21 days (manuscript under review). A question was considered reliable when kappa > 0.60 and/or percent agreement ≥ 80%.⁴⁰ Of the original 33 questions, 23 questions met these criteria for both adolescents with ID and TD adolescents and were considered reliable for use in the overall group comparisons. The 10 questions that were eliminated from further analysis included: 3 questions on physical activity enjoyment and preferences (“How much

do you like to do work around the house like yard work and housework?"; "If you had the choice, would you rather do sports or exercise at home, at a gym or recreation center, or at school?"; and "If you had the choice, would you rather do sports or exercise by yourself, with your friends, or with your family?"; 4 questions on perceived barriers to physical activity (being "too busy"; being "too tired"; being "afraid of getting hurt"; and feeling it is "too hot or cold"); and all 3 of the questions on generalized self-efficacy "(How good are you at doing sports and exercise?"; "How good are you at doing team sports?"; and "How good are you at doing sports and exercise that you do by yourself?"). The final overall group comparisons included 9 items on enjoyment and preferences, 8 items on barriers to physical activity and the 2 items on pets, and 4 items on beliefs about physical activity.

Statistical Methods

Participant characteristics were summarized with means, medians, and proportions and were compared by t-tests and chi-square tests. All of the variables on the questionnaire were categorical. Preference questions that used a 3-tier response scale of "Don't like it", "It's okay", or "Like it" were dichotomized into "Don't like it" vs. "Okay/Like it". One exception to this was the question about watching television and playing video games where no respondents in either group selected the "Don't like it" category. The statistical significance of the difference in response proportions between the groups was established using Pearson chi-square or Fisher's exact test (when expected cell sizes were very small). The two-part questions that queried physical activity barriers were analyzed as separate items. Where differences between ID and TD adolescents were statistically significant at $p < 0.10$, the results were stratified by sex. Statistical significance was considered present when $p < 0.05$ and of borderline significance when $p < 0.10$. Analyses were performed in SAS version 9.2 and IBM SPSS Statistics Version 20.

Results

Sixty TD adolescents and 38 adolescents with ID completed the study. Adolescents resided in urban and suburban communities and the sample was predominantly white. Of those non-white participants, 8 were black (6 TD, 2 ID), 4 were Hispanic/Latino (1 TD, 3 ID), 4 were Asian (all TD), and 9 indicated that they belonged to other racial/ethnic categories (8 TD, 1 ID). Most parents of adolescents in this study were college-educated. Adolescents with ID had an average IQ score of 53.5 on the KBIT-2. Nearly half of the sample (47%) comprised youth with Down syndrome. Adolescents with ID were significantly older (16.8 years vs. 15.3 years, $p < 0.01$) than TD adolescents (Table 1).

Among adolescents with ID, eight participants had 1 invalid interview question, two participants had 2 invalid questions, and one participant had 4 invalid questions. There were 3 questions that were invalid for more than one participant with ID: "Are you ever too tired to do sports and exercise? If yes, does this stop you from participating a lot?" ($n=3$); "Do you think it is ever too hot or cold to do sports and exercise? If yes, does this stop you from participating a lot?" ($n=2$); and "Do you usually have a way to get to that place (to do sports and exercise)? If no, does this stop you from participating a lot?" ($n=2$). Two of these questions also did not meet criteria for reliability.

The distributions of responses to questions about physical activity enjoyment in the two groups are presented in Table 2. Enjoyment of walking, participating in gym class at school, and participating in team sports did not differ between TD adolescents and adolescents with ID. In response to the question, “How much do you like doing sports and exercise that you can do by yourself?”, 21% of adolescents with ID responded “Don't like it” compared to 5% of TD adolescents ($p=0.02$). When the responses to this question were stratified by sex, a difference of borderline statistical significance was seen among males only ($p=0.07$). The groups did not differ significantly in regards to their preference for how to spend their free time ($p=0.35$), although a greater proportion of TD adolescents preferred to do sports and exercise over “something else”. The majority of adolescents in both groups (66% of ID and 75% of TD) enjoyed participating in sports and exercise and reported that it was “a lot of fun”.

The questionnaire included three items on enjoyment of non-physical activities: watching television and playing video games, reading, and arts & crafts. Enjoyment of reading did not differ significantly between adolescents with ID and TD adolescents ($p=0.52$). The difference in enjoyment of arts & crafts was of borderline statistical significance (87% and 72%, for adolescents with ID and TD, respectively, $p=0.08$). A greater proportion of adolescents with ID reported that they “like” television and video games compared to TD adolescents (86% vs. 62%, $p<0.01$). While no adolescent from either group reported that they did not like television, more TD adolescents reported that they think television and video games are just “okay” compared to adolescents with ID. When the results were stratified by sex, the difference in the proportion of responses between the “It's okay” and “Like it” categories was significant for females only. Eighty-one percent of females with ID reported that they “like” television and video games, compared to 42% of TD females ($p<0.01$).

For the item that queried participants' belief about whether sports and exercise were good for them (Table 3), slightly fewer adolescents with ID held this belief than TD adolescents (92% vs. 100%, $p=0.05$). Fewer adolescents with ID also perceived that sports and exercise would make them feel good (84% vs. 95%, $p=0.08$), but this difference was of borderline significance. When the results were stratified by sex, differences were non-significant ($p>0.10$) among females or males. There were no other significant differences between the groups for questions regarding beliefs about physical activity.

The responses to questions about barriers to participation in physical activity in the two groups are presented in Table 4. Most adolescents with ID (78%) reported that they do not ever think that sports and exercise are boring, which was not significantly different from the proportion of TD adolescents (63%, $p=0.14$). Similar proportions of adolescents with ID and TD adolescents reported that they are not ever bothered by how they look doing sports and exercise (78% vs. 75%, $p=0.70$). Adolescents with ID were less likely to respond that they thought they were good at doing sports and exercise compared to TD adolescents (84% vs. 95%, $p=0.06$). Within the subset who answered ‘no’ to this question, there was no significant difference in the proportion of those who perceived this as a barrier to participation ($p=0.99$). Almost all of the TD adolescents (95%) and those with ID (90%) reported that they like how they feel while doing sports and exercise. When asked “Do you

think that sports and exercise are too hard to learn?”, 100% of TD adolescents responded ‘no’, compared to 59% of adolescents with ID ($p<0.001$). When stratified by sex, compared their TD counterparts, the proportion of adolescents with ID who felt that difficulty learning was a barrier was significantly greater for both males and females. Adolescents with ID were less likely to report that they have someone to do sports and exercise with compared to TD adolescents (64% vs. 93%, respectively, $p<0.01$). Among those who answered ‘no’ to this question, there was no significant difference between the groups in the proportion who felt it affected their participation ($p=0.54$). This pattern was present for both males and females. A similar proportion of adolescents with ID and TD adolescents reported having a place to do sports and exercise. Yet, among those who said that they did not have a place to do sports and exercise, a significantly greater proportion of adolescents with ID said that it stopped their participation compared to TD adolescents (14% vs. 1%, $p=0.048$).

Discussion

We examined physical activity enjoyment, perceived barriers, and beliefs through direct reporting by adolescents with ID and sought to determine if these factors differed from those reported by TD adolescents. Overall, adolescents with ID enjoyed participating in physical activity and had positive beliefs about physical activity. For example, the majority of adolescents with ID reported that they liked going for a walk, participating in gym class, doing team sports, and doing individual physical activities. Most adolescents with ID also felt that doing physical activity would make them feel good, is a way to make friends, and is “a lot of fun.” King and colleagues also found that children with ID aged 7-17 reported high enjoyment of physical activities.⁴¹ These encouraging findings provide some indication that interventions to enhance physical activity among youth with ID may be well-received. Interestingly, the majority of adolescents with ID reported that they would like to do more physical activity than they are currently doing. This finding could imply that opportunities for these youth to engage in physical activity may be inadequate or that they face barriers to participation which they are unable to overcome on their own. Half of adolescents with ID reported a preference for doing physical activity in their free time, whereas the other half preferred to do “something else.” A preference for physical activity has been found to be a predictor of regular physical activity habits among adolescents with ID and other disabilities, and^{4,15} is likely to result from successful and enjoyable participation in activities either alone or with others. Providing adolescents with ID with a variety of opportunities to successfully engage in physical activities may be a logical first step toward increasing enjoyment; this, in turn, could lead to physical activity becoming a preferred activity.

Most adolescents with ID in this study did not indicate that their participation in physical activity was restricted by the barriers we queried. Of the barriers that were addressed in the interview, those most often reported by youth with ID were that physical activity was too hard to learn and they did not have a place where they could participate. However, only 14% of participants reported that each of these barriers restricted their participation. Some youth with ID will require supports such as activity modifications and specialized instructional strategies to facilitate skill development and understanding of rules, concepts, and techniques related to successful physical activity participation.⁴² Without this support,

physical activity may, in fact, be too difficult to learn. Not having a place to do physical activity may reflect a lack of available opportunities for youth with ID⁴³ and/or the perception that a special facility is necessary in order to engage in physical activity. Previous studies support that a lack of accessible programs for youth with ID is a barrier to physical activity.²² “Not having a place nearby” has also been reported as a significant barrier to leisure participation among adolescents with ID.²³ Few adolescents with ID in our study reported that their participation was restricted by not having someone to do physical activity with (8%), being bothered by how they look doing physical activity (11%), or that physical activity was boring (8%). Almost all adolescents with ID felt that they were good at doing physical activity, which suggests that a lack of self-confidence in this realm may not be a barrier that needs to be addressed for these youth. In a review of perceived barriers and facilitators to physical activity among children with disabilities,¹⁵ several barriers were reported for youth with ID that were akin to those that we found, including lack of friends to participate with, lack of knowledge about exercise, and inadequate or inaccessible facilities. Although the barriers we queried did not reportedly hinder physical activity participation for many of our participants, it may be that their parents have been able to overcome them. These barriers should still be considered when planning programs, as previous work supports their relevance. Further, there are additional barriers to physical activity participation that were either not queried in this study or were not included in our analysis because the questions did not meet the criteria for reliability.

In the comparison of adolescents with ID and TD adolescents, there is evidence of differences related to enjoyment and barriers to physical activity. First, fewer adolescents with ID reported they enjoyed physical activities that are performed individually, compared to TD adolescents. This difference between groups may indicate that youth with ID prefer activities that involve social interaction. There is some evidence for peer socialization as a way to increase enjoyment and motivation of youth with ID to engage in physical activity and exercise.⁴⁴⁻⁴⁶ Another explanation of the difference is that individual activities require a level of independence that the youth with ID and/or their families may not feel comfortable with or have yet to experience. Since youth with ID often engage in solitary leisure activities,⁴⁷ it may be that participating in group- or team-based physical activities is perceived as more enjoyable. Second, a notable distinction between the groups was that a portion of adolescents with ID reported that their participation was hindered because physical activity was too hard to learn, while no TD adolescents perceived this to be a barrier. Fortunately, this barrier is not insurmountable. The use of appropriate program supports, instructional strategies, and activity modifications could facilitate learning and participation.⁴² Third, more adolescents with ID than TD adolescents reported that they did not have someone to do physical activity with. It may be that adolescents with ID have fewer friends and are more limited to home-based activities. Also, adolescents with ID may need to rely on others for support, thus this barrier would be very relevant to this group. TD adolescents are unlikely to face the same obstacles.

Adolescents with ID, particularly females, expressed greater enjoyment of watching television and playing video games compared to TD adolescents. Television watching has been reported as a frequent leisure activity for youth with ID.²³ Watching television is a safe, entertaining activity that can be done independently and does not require exceptional

skills, parental support, or transportation. It is likely that enjoyment of television and video games, which are generally sedentary activities, influences how adolescents with ID choose to spend their leisure time. Providing enjoyable and accessible physical activity opportunities to youth with ID is important to promote an active lifestyle and decrease sedentary time. It may be worthwhile considering active video gaming as an alternative to more traditional forms of physical activity as a way to increase movement among girls with ID in particular.

The findings of the present study have some implications that should be considered for physical activity promotion among adolescents with ID. Adolescents with ID reportedly enjoy participating in a variety of physical activities, individually and in teams. Simply put, these youth feel that physical activity is fun and many would like to do more of it. This suggests that providing adolescents with ID the opportunity to engage in physical activity may be all that is necessary to promote participation. Efforts may be needed by service providers to include adolescents with ID in school and community programs through providing the support necessary to promote their success. This could involve offering a range of activities and supports, reducing/eliminating attitudinal, physical, or policy barriers, partnering with families and/or disability organizations, training staff, and respecting individual differences. Parents also likely have an important role to play in identifying opportunities for their child. Given that adolescents with ID may already be motivated to be active, parents may serve as important advocates in promoting and supporting their participation.

The barriers most frequently reported by adolescents with ID support the need for good quality instruction provided in an accessible setting. These adolescents may be less inclined to perceive that physical activities are too hard to learn if program providers are well-trained and use instructional techniques that maximize learning and skill development. As adolescents with ID gain skills, they will have more successful physical activity experiences, which in turn will facilitate their learning.

Adolescents with ID endorsed the notion that physical activity is a way to make new friends and to feel good, and they also indicated that they are good at doing physical activities. Promoting the social aspects of physical activity may be particularly appealing for adolescents with ID,⁴⁵ and encouraging them to try physically demanding and/or challenging activities may further promote proficiency and self-confidence. Overall, adolescents with ID enjoy physical activity for similar reasons as their TD peers, though they may face some unique obstacles to participation. The challenge is for program providers to effectively meet the needs of these youth within existing inclusive opportunities, where possible, rather than creating self-contained programs targeting only youth with disabilities.

The findings of this cross-sectional study should be considered in light of its limitations and strengths. The study was based on small non-representative samples of adolescents with ID and TD adolescents, which may not reflect the respective source populations. While we attempted to recruit equal numbers in each group, we found it far more difficult to enroll adolescents with ID and fell short of our proposed sample size of 60 participants per group.

Notwithstanding this limitation, we were able to identify some significant differences between the groups. Although considerable efforts were made to recruit a sample with socioeconomic and racial/ethnic diversity, the final sample was predominantly white and well-educated. As such, the generalizability of the results is limited.

In order to make the questions easy to answer and to facilitate the responses, we developed an instrument comprising close-ended questions. We acknowledge that this restricts our ability to understand why adolescents do or do not perceive given barriers, do or do not enjoy given activities, or have certain beliefs about physical activity. A greater understanding of the factors potentially related to physical activity behavior and the reasons for adolescents' responses could be obtained from a qualitative study using open-ended questions. Also, 10 of the items on the questionnaire, including those that addressed self-efficacy and several important barriers, did not meet the criteria for reliability and were not included in the analysis. While the omission of these questions was necessary to ensure that the overall interview was reliable, the consequence is that some potentially meaningful correlates were not examined. However, a strength of this study lies in the administration of a reliable interview that directly queries adolescents with ID about factors that could influence their physical activity participation. The comparison group of TD adolescents permitted us to determine where the factors between these groups differed, an important step toward designing tailored interventions.

Future research is needed to examine additional factors that could hinder or facilitate physical activity behavior among youth with ID. Studies that use qualitative methods (i.e., open ended questions) and those that examine the consistency of perceived barriers among youth and their parents may also assist in addressing those factors that inhibit participation. Longitudinal observational studies and experimental studies that are consistent with cause-and-effect associations among various factors and physical activity behavior in youth with ID are needed for effective program design in community settings.

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Table 1

Comparison of Characteristics between Adolescents with ID and TD Adolescents

	TD Adolescents (n=60)				Adolescents with ID (n=38)				p-value
	Mean (SD) or %	Median	Min	Max	Mean (SD) or %	Median	Min	Max	
Age (y)	15.3 (1.5)	14.9	13	18.7	16.8 (1.8)	16.8	13.1	21.8	<0.001
KBIT Score ^a	--	--	--	--	53.5 (11.6)	49	40	73	--
Vineland Composite ^b	--	--	--	--	66.4 (5.4)	66.0	58	81	--
Male (%)	60% (n=36)	--	--	--	45% (n=17)	--	--	--	0.14
% White Race/Ethnicity	68% (n=41)	--	--	--	84% (n=32)	--	--	--	0.08
At least 1 parent with college degree ^c	82% (n=49)	--	--	--	72% (n=26)	--	--	--	0.29

^a KBIT Score (Kaufman Brief Intelligence Test) is the composite score of verbal and non-verbal ability used to confirm the presence of an ID which is defined as ≤ 75

^b n=31

^c n=36 participants with ID

Table 2

Enjoyment of Physical Activities

		TD	ID	
		n (%)	n (%)	p-value
Walking				
	Don't Like It	4 (7)	6 (16)	0.18 ^a
	It's Okay/Like It	56 (93)	32 (84)	
Gym Class				
	Don't Like It	1 (2)	1 (3)	1.0 ^a
	It's Okay/Like It	56 (98)	37 (97)	
Team Sports				
	Don't Like It	3 (5)	4 (11)	0.42 ^a
	It's Okay/Like It	57 (95)	33 (89)	
Individual Sports and Exercise				
	Don't Like It	3 (5)	8 (21)	0.02 ^{a, b}
	It's Okay/Like It	57 (95)	30 (79)	
What would you rather do in your free time?				
	Sports /Exercise	35 (58)	18 (49)	0.35
	Something Else	25 (42)	19 (51)	
How much fun do you have doing sports /exercise?				
	No Fun at All	1 (2)	3 (8)	0.29 ^a
	Some Fun	14 (23)	10 (26)	
	A Lot of Fun	45 (75)	25 (66)	

^a p-value from Fisher's exact test

^b When stratified by sex, there was no significant difference among females (p=0.17) and a borderline difference among males (p=0.07).

Table 3

Beliefs about Physical Activity

	TD	ID	
	n (%)	n (%)	p-value
Do you think sports and exercise are good for you?			
No	0	3 (8)	0.05 ^{a,b}
Yes	60 (100)	34 (92)	
Do you think sports and exercise is a way to make friends?			
No	2 (3)	5 (14)	0.10 ^a
Yes	58 (97)	32 (86)	
Do you think doing sports and exercise will make you feel good?			
No	3 (5)	6 (16)	0.08 ^{a,b}
Yes	57 (95)	32 (84)	
Would you like to do more sports and exercise?			
No	11 (18)	6 (16)	0.75
Yes	49 (82)	32 (84)	

^a p-value from Fisher's exact test

^b When stratified by sex, there was no significant difference ($p > 0.10$) among females or males

Table 4

Perceived Barriers to Physical Activity

	TD	ID	
	n (%)	n (%)	p-value
<i>Do you think that sports and exercise are boring?</i>			
No	38 (63)	28 (78)	0.14
Yes	22 (37)	8 (22)	
Doesn't stop participation	11 (18)	5 (14)	0.69 ^a
Stops participation	11 (18)	3 (8)	
<i>Do you think that sports and exercise are too hard to learn?</i>			
No	60 (100)	22 (59)	<0.001 ^b
Yes	0	15 (41)	
Doesn't stop participation	--	10 (27)	--
Stops participation	--	5 (14)	
<i>Are you ever bothered by how you look when you 're doing sports and exercise?</i>			
No	45 (75)	29 (78)	0.70
Yes	15 (25)	8 (22)	
Doesn't stop participation	13 (22)	4 (11)	0.13 ^a
Stops participation	2 (3)	4 (11)	
<i>Do you think you are good at doing sports and exercise?</i>			
Yes	48 (84)	36 (95)	0.06 ^c
No	9 (16)	2 (5)	
Doesn't stop participation	6 (11)	2 (5)	0.99 ^a
Stops participation	3 (5)	0	
<i>Do you like how you feel when you 're doing sports and exercise?</i>			
Yes	56 (95)	34 (90)	0.71
No	3 (5)	4 (10)	
Doesn't stop participation	2 (3)	2 (5)	0.99 ^a
Stops participation	1 (2)	2 (5)	
<i>Do you usually have someone to do sports and exercise with?</i>			
Yes	56 (93)	23 (64)	<0.01 ^d
No	4 (7)	13 (36)	
Doesn't stop participation	4 (7)	10 (28)	0.54 ^a
Stops participation	0	3 (8)	
<i>Do you usually have a place to do sports and exercise?</i>			
Yes	55 (92)	32 (86)	0.49
No	5 (8)	5 (14)	
Doesn't stop participation	4 (7)	0	0.048 ^a
Stops participation	1 (1)	5 (14)	
<i>You said you have a place to do sports and exercise. Do you have a way to get to that place?</i>			
No	1 (2)	3 (10)	0.12 ^a
Yes	54 (98)	27 (90)	

		TD	ID	
		n (%)	n (%)	p-value
<i>Do you have a pet?</i>				
	No	17 (28)	10 (27)	0.89
	Yes	43 (72)	27 (73)	
<i>If you have a pet, do you walk, run, bike, or play catch with your pet?</i>				
	No	18 (43)	10 (38)	0.72
	Yes	24 (57)	16 (62)	

^a p-value from Fisher's exact test

^b When stratified by sex, the relationship remained significant among females and males ($p < 0.001$)

^c When stratified by sex, there were significant differences among females ($p = 0.01$) but not males

^d When stratified by sex, there were significant differences among females ($p = 0.007$) and a borderline difference among males ($p = 0.05$)