

HOBBY PREFERENCES AND PHYSICAL ACTIVITY PARTICIPATION
AMONG CHILDREN WITH AND WITHOUT AUTISM SPECTRUM DISORDER

By

Scott Russell

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Committee Membership

Dr. Sean Healy, Committee Chair

Dr. Chris Hopper, Committee Member

Dr. Rock Braithwaite, Committee Member

Dr. Justus Ortega, Program Graduate Coordinator

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ABSTRACT

HOBBY PREFERENCES AND THE OF PHYSICAL ACTIVITY PARTICIPATION AMONG CHILDREN WITH AND WITHOUT AUTISM SPECTRUM DISORDER

Scott Russell

BACKGROUND: Children diagnosed with Autism Spectrum Disorder (ASD) exhibit low physical activity levels and are at an increased risk for health problems related to sedentary behaviors. Hobby preferences have been shown to influence physical activity participation. **PURPOSE:** The purpose of this study is to examine the hobby preferences of children with ASD and determine if there are differences depending on the children's physical activity level and the nature of their preferred activities. A secondary purpose is to describe the hobby preferences of children with ASD. **METHODS:** Participants include 98 nine-year-old children (with and without ASD) from the National Growing up in Ireland Study. A number of questions adapted from the Leisure Time Exercise Questionnaire were utilized to measure moderate-to-vigorous physical activity and hobby preferences. **RESULTS:** Chi-square, T-test and ANOVA analysis indicated children with ASD are less active than their TD peers, less likely to prefer active hobbies, and lastly, children with ASD were less active than their TD peers regardless of hobby preference type. **CONCLUSION:** This study provides frequency data on the hobby preferences of children with ASD. The study also provides further evidence of the need for interventions tailored to the hobby preferences of this population.

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INTRODUCTION

Children with disabilities exhibit lower levels of physical activity participation than their typically developing peers (Murphy & Carbone, 2008). Individuals who engage in more sedentary behaviors and activities are at an increased risk for both short and long-term health consequences (National Center for Health Statistics, 2008). Children diagnosed with Autism Spectrum Disorder (ASD) are faced with impairments in social communication, building and maintaining relationships, and reciprocal interactions (American Psychiatric Association, 2013). These impairments, along with high rates of motor skill deficits, lead to an increased likelihood of sedentary behaviors and associated harmful health outcomes (Hill, Zuckerman, & Fombonne, 2015). Children with ASD may benefit from modifications to promote physical activity and reduce sedentary behaviors. Developing a better understanding of the hobby preferences of children with ASD and its association with physical activity levels will help to guide future development of programs and interventions that aim to increase physical activity participation in this growing population.

Background

Regular physical activity has indisputable health benefits such as improvements in cardiovascular health, muscular strength, bone density, and overall mental health (CDC, 2011). With rates of obesity, and diabetes rising in adults and children (McGuire, 2011), it is paramount that regular physical activity occurs at all ages to maintain good health

(CDC, 2011). Despite identifying the problem, internationally, children still show inadequate levels of physical activity necessary for full realization of these benefits. National guidelines recommend 60 minutes of moderate-to-vigorous physical activity (MVPA) every day for youth and children (CDC, 2011). Yet only 27.1% of youth met this guideline in the U.S. (Kann et al., 2014). Furthermore, children diagnosed with a disability show even more alarmingly low rates of physical activity (Murphy, & Carbone, 2008). Individuals with disabilities are especially at risk of living a sedentary lifestyle in adulthood and thus are diagnosed with obesity, diabetes, and coronary heart disease at much higher rates (National Center for Health Statistics, 2008). In fact, 1 in 4 persons with a disability reported no physical activity in a given week (Healthy People, 2010). For children with disabilities, regular physical activity has shown to provide more than just the well-known physiological benefits. Regular physical activity has shown to slow the progression of chronic disease, increase motor function, and provide social opportunities that these individuals are often excluded from participating in (King, Lawm, Rosenbaum, Kertoy, & Young, 2003). With children of all abilities participating in physical activities well below the recommended rates (Kann et al., 2014), it is imperative that physical activity and sport practitioners (including physical educators) better understand what motivates a young person to be physical active.

Of the multitude of disabilities described in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V), ASD has received an increased focus in research over the past 20 years. This is because of an alarming increase in diagnosis of ASD during this time. In 2000, roughly 1 in 150 children were diagnosed while today 1 in 68 children are

affected by the neurological disorder (Christensen, 2016). ASD is defined in the DSM-V as a complex developmental disorder with different effects and severity of symptoms in each individual (American Psychiatric Association, 2013). ASD is prevalent in all ethnic groups and is four times as likely in boys as in girls (Christensen, 2016). While no two individuals diagnosed with ASD are the same, there are some common symptoms observed in children and adolescents who are on the ASD spectrum. There are now two categories of ASD characteristics used for diagnostic purposes. The first category, a persistent deficit in social communication, including having difficulty with social reciprocity, non-verbal communicative behaviors, and the ability to develop, maintain, and understand relationships. The second indicator of ASD is the presence of restrictive or repetitive patterns of behavior, activity, or interests (American Psychiatric Association, 2013). Cognitive skills can vary for individuals diagnosed with ASD and some have an increased risk of medical conditions such as seizures and sleep problems as well as other genetic or developmental disorders (Cohen et al., 2005). Along with a deficit in social skills, decreased motor control can also affect physical activity levels (Must, Phillips, Curtin, & Bandini, 2015).

Research has shown that children with ASD are up to 40% more likely to be obese or overweight when compared to their typically developing peers (Curtin, Anderson, Must, & Bandini, 2010). While other factors, such as diet (Shreck & Williams, 2006), medication (Maayan & Correll, 2011), and opportunity for physical activity (Memari, Ziaee, Shavestehfar, Ghanouni, Mansournia, & Moshavedi, 2013), can also influence obesity rates in youth with ASD, the positive impact and importance of meeting

recommended physical activity guidelines remains a modifiable risk among this population. Physical activity patterns track from childhood through adolescence and into adulthood (Friedman, Martin, Tucker, Criqui, Kern, & Reynolds, 2008), therefore it is essential that practitioners understand what inspires a young person with ASD to be physically active. A better understanding of this population's opportunities for inclusion, perceived barriers, and preferences for activity may increase their physical activity levels. Less opportunity for physical activity involvement has already been well documented (Pan & Frey, 2006). However, when examining the perceived barriers of young individuals with and without ASD, Stanish, Curtin, Must, Phillips, Maslin, & Bandini (2015) found that individuals with ASD reported barriers such as being too busy, fear of injury, boredom, or feeling too hot or too cold most frequently. When compared to their typically developing(TD) peers, some of these barriers – fear of injury, feeling to hot or cold – were especially likely to cause individuals with ASD to stop participation at higher rates than their TD peers (Stanish et al., 2015). It is clear that interest in activity plays an important role in activity selection and engagement.

Due to the belief that hobby preferences affect activity engagement, there has been a multitude of studies examining the hobby preferences of specific groups. However, many of these studies focus on adult-age special groups such as various cancer survivors, individuals diagnosed with schizophrenia and other serious mental illness (SMI), or specific ethnic groups. For example, a study of rural breast cancer survivors' preferences for physical activity found that participants of little to no experience with physical activity were more likely to experience satisfaction in low intensity activities

(Vallance, Lavallee, Culos-Reed, & Trudeau, 2013). Individuals with schizophrenia or bi-polar disorder showed similar preferences – such as walking at moderate pace and a desire for social support – allowing practitioners to streamline efforts in increasing physical activity levels of individuals with SMI (Subramaniapillai et Al. 2016). In older adult African American Females, more gentle forms of activity such as tai chi or yoga were most popular however; socio-economic barriers had a large impact on participation (Gothe & Kendall, 2016). This research is useful for intervention development for these specific groups, but the findings cannot be generalized toward other specific special groups – for example, youth with ASD. While there has been a number of studies that focused on physical hobby preferences of children and adolescents, there was little to no distinction between children with and without disabilities, including ASD. One such study of the preferences of middle school students found that individuals may become disengaged in activity units they do not prefer (Hill & Hannon, 2008). In comparing the preferences of 9th grade males and females, Hill & Cleven (2005) found significant differences between physical hobby preferences in boys and girls. Girls showed more interest in non-contact activities and a large portion of girls were described as having no opinion towards physical activity or education, a possible indication of gender bias in current physical education practices (Hill & Cleven, 2005).

Due to the unique characteristics of individuals with ASD – including social, behavior, and sensory differences – hobby preferences among children with ASD may differ from children without ASD. In addition, due to the tendency for children with ASD to be more sedentary, an understanding of their hobby preferences is warranted. A recent

review of correlates of physical activity among children with ASD report correlates such as a consistent negative association between age and physical activity and an inconsistent negative association between sex and physical activity (Jones et al., 2017). However, the authors note that there is a need for research on how hobby preferences are associated with physical activity levels among this population. An understanding of their hobby preferences will allow for more tailored, relevant interventions and program curriculums to be developed. Incorporating their interests may lead to an increase physical activity engagement and achievement of the associated health benefits.

Study Purpose

The purpose of this study is to examine the hobby preferences of children with ASD and determine if there are differences depending on the children's physical activity level and the nature of their preferred activities. A secondary purpose is to describe the hobby preferences of children with ASD.

METHODS

Participants

The first wave of the nationally representative data set, Growing Up in Ireland (GUI) provided data on physical, behavioral, psychological, environmental, and cognitive outcomes for 9-year olds living in Ireland. Using a systematic stratified sampling procedure, 8570 participants ($n=8570$) from 910 schools across Ireland were recruited. The data set was collected between September 2007 and June 2008. Ethical approval was given by the Research Boards' Research Ethics Committee. Both parents and children completed questionnaires on a number of outcomes regarding the child's characteristics, experiences, and development. Teachers and school principals were also tasked with providing information on the child's social, emotional, cognitive development, and school characteristics. Response rates at the school level were 82%; 57% at the family level. More information regarding the data set, including methodology and framework, can be found in Murray et al. (2011).

This study included 98 participants ($n=98$). Forty-nine of the participants were children diagnosed with ASD while 49 typically developing (TD) children were randomly selected for comparison purposes. The 'TD group' equaled the 'ASD group' gender make-up with forty-two males to seven females in each. Children were placed in the 'ASD group' only if their primary caregiver reported an ASD diagnosis was made by a medical professional. Specific professionals who may provide a diagnosis is outlined in

Health Service Executive (2012), and include professionals such as psychologists, psychiatrists, community pediatricians, speech and language therapists, clinical nurse specialists, and social workers.

Measures

There were multiple parent and self-reported measures included in the analysis. A number of questions adapted from the Leisure Time Exercise Questionnaire (Godin & Shepard, 1985) was utilized to measure physical activity. Participation in MVPA was assessed by posing the following question to the parent. “How many times in the past 14 days, has the Study Child done at least 20 minutes of hard exercise to make you breathe fast and make your heart beat faster? Activity examples were provided such as playing soccer, jogging, or cycling at an accelerated pace. This measure has demonstrated concurrent validity when used in previous research that measured maximum oxygen intake (VO₂ max) and muscular endurance (Cadogan et al., 2014; Godin et al., 1986) with acceptable test-retest reliability (Sallis et al., 1993). A similar question was posed to the children to provide self-reported data on the PA levels between groups. The question was as stated: “In the past week, what is the number of days that you have been physically active for at least 60 minutes per day?” Responses were recorded numerically.

To assess hobby preferences among the participants, the question “what is your favorite hobby or activity?” was posed to the child, and they were able to choose from 32 hobby types. Two researchers separately categorized the 32 activities into three distinct groups: active, sedentary, and unknown (not clearly active or sedentary). A consensus

was reached through discussion when any differences of opinions were found. Examples of active activities included soccer, swimming, cycling, with 14 active activities identified in total. Sedentary activities included hobbies and activities such as arts & crafts, playing an instrument, and watching TV, with 12 sedentary activities identified in total. Six activities were determined by both researchers to be too ambiguous to be categorized as active or sedentary with confidence and thus were labeled unknown. Frequency data on the hobby preferences of the sample group was compiled using results from the previously stated “favorite hobby” question and can be found in table 2.

Statistical Analysis

Descriptive statistics were provided for the nature of the hobby preferences (active versus sedentary) and physical activity levels for both the ASD and TD group. Chi square analysis was used to compare the nature of hobby preferences between children with and without ASD and an independent samples T-test was used to compare physical activity levels between groups. Among the children with ASD, an independent samples T-test was used to compare physical activity levels between children with *active* hobby preferences and *sedentary* hobby preferences. To compare PA levels between children with and without ASD, with active hobby preferences or sedentary hobby preferences, an ANOVA was utilized. If the equality of variance assumption is violated, a nonparametric equivalent will be used. Finally, descriptive statistics were provided for hobby preferences for children with ASD.

RESULTS

Physical Activity Levels

Parent and self-reported measures of physical activity were examined to evaluate differences between groups. Parents reported on the number of times their child participated in MVPA and light exercise over the past 14 days. Regarding MVPA, it was revealed that children with ASD engaged in fewer days ($M = 3.73$, $SD = .193$) than their typically developing peers ($M = 4.43$, $SD = .140$), $t(96) = -2.912$, $p = .004$. Comparisons of LPA participation revealed non-significant differences, $t(96) = -.953$, $p = .343$. There was a significant moderate positive correlation between self-reported number of days with 60 minutes of physical activity per week, and parent-report number of days of MVPA in the previous two weeks ($r = .34$, $p = .027$). Child-reported data indicated that children with ASD reported to engage in fewer days of 60 minutes of physical activity during the week ($M = 3.91$, $SD = .339$) than their typically developing peers ($M = 5.53$, $SD = .327$), $t(92) = -3.434$, $p = .001$.

Hobby Preferences and Physical Activity Levels

A Chi-square test revealed children with ASD and TD children significantly differed in respect to having active versus sedentary hobby preferences ($X^2(2, N = 94) = 15.333$, $p < .001$). Among the children with ASD, 53.3% ($n = 24$) reported a favorite hobby that was sedentary in nature while 33.3% ($n = 15$) preferred an active hobby. Ten

children with ASD failed to respond to this question or selected 'other' for their answer. Among TD children 73.5% (n= 36) reported to have an active hobby, and 22.4% (n = 11), reported a sedentary hobby. Two TD children either failed to respond to the question or selected 'other' for their response.

To compare physical activity levels between children with and without ASD, who had active or sedentary hobby preferences, an ANOVA was run using the four groups. The four groups were children with ASD who had an active hobby preference (n = 15), children with ASD with a sedentary hobby preference (n=24), TD children with an active hobby preference (n=36), and TD children with a sedentary hobby preference (n= 11). First, due to a violation of the assumption of normality of variance, a non-parametric Kruskal-Wallis test was conducted to assess differences in parent-reported vigorous physical activity between groups. However, no significant differences were revealed, $p > .05$. See table 1 for physical activity levels between groups. Second, physical activity levels were compared based on child-report data (days of physical activity over the past week). Significant differences between the four groups was revealed; $F = 3.416$, $p = .021$. A post-hoc Bonferroni correction showed that TD children who had an active hobby preference were significantly more active ($m = 5.69$, $SD = 2.189$), than children with ASD who had a sedentary hobby preference ($m = 3.96$, $SD = 2.4770$). See table 1.

Hobby Preferences

Frequency data were collected on the hobby preferences of children with and without ASD. Among the children with ASD, the most frequently reported preferred

hobby was playing video games, reported by 20.4% of the sample (n=10). Conversely, playing video games was only cited as being a preferring hobby by 2 percent (n=1) of the TD sample. The next hobby type chosen most frequently by the group with ASD was football or soccer, reported by 10.2% (n =5); in comparison, among the TD group, this hobby was reported as being the preferred hobby of choice by 24% (n=12). It is interesting to note, that among the TD group, the three most frequently reported hobby preferences were all active; soccer or football, sport or activities not otherwise specified, and swimming. See table 2 for an overview of hobby preferences.

DISCUSSION

The primary purpose of this study was to examine the hobby preferences of children with ASD and determine if physical activity levels differed, depending on the nature of their hobby preferences. The results revealed that children diagnosed with ASD reported more sedentary hobby preferences than their TD peers. Over 50% of children with ASD reported a preference for a sedentary hobby, while more than 70% of TD children preferred an active hobby. This trend is in agreement with previous research demonstrating that children with ASD are not only less active than their peers (Murphy & Carbone, 2008), but also more likely to prefer sedentary and solitary activities, such as watching television or playing video games (Must, et al., 2015). Various reasons may exist for this; first, due to the unique challenges experienced by children with ASD including social and motor deficits, traditional sports that require teamwork and dynamic movement patterns may be less appealing or perceived to be too difficult (Stanish et al., 2015). Furthermore, regarding social interaction, previous research has shown that fewer children with ASD believed physical activity to be an opportunity to make friends than their TD peers (Stanish et al., 2015). Previous research involving students with ASD discussing their physical education experiences provides further insight into the social barriers to participation in physical activity. A prominent perceived social barrier is the increased likelihood to be victimized compared to their TD peers (Montes & Halterman, 2007). In research by Healy, Msetfi, & Gallagher (2014) children with ASD spoke of a

number of issues that arise in a physical activity setting such as individual challenges, including fear of injury or inability to keep up with pace of play, and sensory issues involving auditory, heat, and tactile sensitivity. These perceived barriers may help to explain why children with ASD are more likely to prefer activities that are sedentary and solitary in nature, especially activities that allow them to control the amount of sensory input they receive, such as video games or television. Another consideration is the preference for routines or ritualistic behaviors that individuals with ASD often exhibit. This may hinder their ability to participate in unfamiliar activities or develop new motor skills.

The activity levels between individuals with ASD who preferred active hobbies and those with ASD who preferred sedentary hobbies were not significantly different based on parent reported data. Children with ASD who preferred sedentary hobbies exhibited similarly physical activity levels as children with ASD who preferred active hobbies. Some possible reasons for this may include parent's influence on activity at young ages by serving as "gatekeepers" in which they determine what activities and resources are available to the child (Welk, Wood, & Morss, 2003). With parents playing a key role in influencing activity levels of young children, it is important to continue to support parents' efforts to promote physical activity. However, it is also important to be cognizant that as a child with ASD ages and gains autonomy their own preferences may be more influential on their health behaviors, including physical activity. Future research should not only examine why activity levels do not differ between children with active versus sedentary hobbies but also how physical hobby preferences change as the child

gets older and gains more autonomy over their activities. This relationship between autonomy and its effect on physical activity of adolescents with ASD may be reflected in the results of previous research. Stanish et al., (2017), found that younger individuals with ASD exhibit physical activity levels more similar to their TD peers while older adolescents reported reduced levels of MVPA compared to their TD peers as well as a decline when compared to their younger selves. Further research is needed to fully characterize the activity habits of adolescents with ASD as there are some conflicting reports (Pan & Frey, 2006).

A secondary purpose of this study was to provide frequency data on the hobby preferences of children with ASD. This was a worthy purpose, as an understanding of hobby preferences of children with ASD may inform intervention development. As previously stated, playing video games was the most popular among children with ASD. Perhaps this is due to children with ASD having a preference for activities and hobbies that appeal to their visual and auditory senses that can be done in a comfortable and controlled setting with or without a partner. Previous research by Stanish et al., (2017), reported that active video gaming was one of the most popular activity in a similar study. This is further evidence that one should be cognizant of the child's preference for video games when considering the development of exercise interventions for youth with ASD. Previous research has successfully incorporated "exer-gaming" as a means of significantly reducing repetitive behaviors in youth with ASD (Anderson-Hanley, Tureck, & Schneiderman, 2011).

Limitations and future research

There are some limitations within the current study that must be acknowledged and further examined in future research. One such limitation is the relatively small sample size, especially when compiling frequency data on the hobby preferences of children with ASD. While the current study provides insight into these hobby preferences, more research is needed to provide a clearer view of the true desires of such a diverse population. The questionnaire utilized in this study took geographical and cultural activities or hobbies, such as hurling or camogie, into consideration. This limits the application of the results of this study to similar geographical regions and requires that future research examine the hobby preferences of other regions and cultures. This study relied on self-reported data from a young sample group, which may not provide the most accurate response in regards to physical activity levels. The present study did not provide any information on the severity of ASD within the sample group and future research should consider how the hobby preferences and physical activity levels might differ at different levels of the spectrum. Future interventions should seek to incorporate the hobby interests of children with ASD into design in effort to develop healthy habits and encourage continued participation in physical activities.

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APPENDIX

Table 1. Physical activity levels among groups by hobby preference.

	ASD with Active Hobby Preference (n=15) m(SD)	ASD with Sedentary Hobby Preference (n=24) m(SD)	TD with active hobby preference (n=36) m(SD)	TD with sedentary hobby preference (n=11) m(SD)
Vigorous physical activity over 14 days	4.07 (1.16)	3.67 (1.40)	4.53 (0.77)	4.00 (1.48)
Number of days active in one week	4.00 (2.17)	3.96 (2.48)	5.69 (4.79)	2.90 (2.58)

Table 2. Hobby preferences among children with and without ASD.

	ASD (n=45) n(%)	TD (n=49) n(%)
Playing video games	10(20.4)	1(2.0)
Football or soccer	5(10.2)	12(24.5)
Reading or writing	3(6.1)	4(8.2)
Interacting with friends other than sport	3(6.1)	0
Arts, crafts, and cookery	3(6.1)	3(6.1)
Sport or physical exercise not otherwise specified	3(6.1)	5(10.2)
Watching TV or DVDs	2(4.1)	1(2.0)
Non-physical activities such as go-karting	2(4.1)	0
Youth clubs and related groups	2(4.1)	0
Swimming	2(4.1)	4(8.2)
General play	1(2)	1(2.0)
Playing with toys or other indoor games	1(2)	0
Spending time with family	1(2)	1(2.0)
Horse or pony riding	1(2)	1(2.0)
Other individual sport	1(2)	3(6.1)
Dancing	1(2)	0
Other hobby: Collecting	1(2)	0
Other hobby: Not specified	1(2)	0
Basketball	1(2)	1(2.0)
Gymnastics	1(2)	1(2.0)
Hurling or Camogie	0	4(8.2)
Rugby	0	3(6.1)
Other team sport	0	1(2.0)
Cycling	0	1(2.0)