
Out-of-School Participation Patterns in Children With High-Functioning Autism Spectrum Disorders

Claudia List Hilton, Mary Catherine Crouch, Heidi Israel

KEY WORDS

- autism
- interpersonal relations
- leisure activities
- pediatrics
- socialization

PURPOSE. This study examined differences in out-of-school activity participation between typically developing children and those with high-functioning autism spectrum disorders (HFASD).

METHOD. Children with HFASD, ages 6 to 12 ($N = 52$), and a control group ($N = 53$) were assessed using the Children's Assessment of Participation and Enjoyment and the Social Responsiveness Scale.

RESULTS. Significant differences were seen in participation between typical and HFASD groups in number of activities in which children participate, the numbers of individuals with whom they participate, and the variety of environments in which they participate.

CONCLUSIONS. These findings indicate that out-of-school participation is significantly different for children with HFASD than for typically developing peers. Findings suggest that social impairment is related to some aspects of participation and that addressing social skills in intervention could contribute to increased participation in out-of-school activities by children with HFASD, which would contribute to their long-term mental and physical health.

Hilton, C. L., Crouch, M. C., & Israel, H. (2008). Out-of-school participation patterns in children with high-functioning autism spectrum disorders. *American Journal of Occupational Therapy, 62*, 554–563.

Claudia List Hilton, PhD, OTR/L, SROT, is Postdoctoral Fellow, Social Development Studies, Department of Psychiatry, Washington University School of Medicine, 18 S. Kingshighway Blvd., Ste. L-100, St. Louis, MO 63108; hiltonc@psychiatry.wustl.edu

Mary Catherine Crouch, MOT, OTR/L, is Staff Occupational Therapist, Occupational Therapy Department, Barnes-Jewish Hospital, St. Louis, MO.

Heidi Israel, PhD, RN, LCSW, is Assistant Professor, Department of Orthopaedic Surgery, Saint Louis University, St. Louis, MO.

The need to engage in purposeful occupation is innate and related to health and survival. (Wilcock, 1993, p. 17)

Participation is essential to the growth and development of children and continues to directly relate to a person's health and well-being (Law & King, 2000; Law, Steinwender, & Leclair, 1998). Children diagnosed with high-functioning autism spectrum disorders (HFASD) are at risk for reduced participation. We examined the differences in patterns of participation in out-of-school activities between typically developing children and those with HFASD; we also examined the relation between autistic trait severity and participation in those activities.

Literature Review

Importance of Participation

The importance of participation in the lives of children has been examined in several studies. Law and King (2000) observed that participation in formal and informal activities is the "context in which children form friendships, develop skills and competencies, express creativity, achieve mental and physical health, and determine meaning and purpose in life" (p. 1). They proposed that participation in activities is how children develop an understanding of the expectations of society and gain the physical and social skills needed to function and flourish. Law et al. (2004) concluded that participation in everyday activities plays an important role in a child's social development and influences her or his long-term mental and physical health.

Participation of Typically Developing Children and Adolescents

In a study of typically developing children's occupations, Lawlor (2003) posited that children are socially occupied beings acting in a socially constructed world. She used ethnographic examples of children's engagement to show that children's participation in occupations represents the "interconnectedness of social relatedness, intersubjectivity, social action, and engagement" (p. 424). Participation in leisure occupations has been found to be an important predictor for future mental and physical health and life satisfaction in several studies (King et al., 2004; Larson & Verma, 1999; Tinsley & Eldredge, 1995). Larson (2000) found that participation by the general population in voluntary structured activities, such as sports, arts, and organizations, is the best context for developing initiative. From the examination of 3,771 adult leisure activity questionnaires, Tinsley and Eldredge (1995) concluded that participation in leisure occupations is an important source of need gratification that affects the physical and mental health of the individual.

Participation of Children and Adolescents With Disabilities

Law and King (2000) examined children with disabilities and found them to be at risk for lower participation in everyday activities because of personal and environmental factors that may limit them from fully participating. In a later study, Law et al. (2004) used the Children's Assessment of Participation and Enjoyment and the Preferences for Activities of Children (CAPE/PAC; King et al., 2004) to assess participation of 427 children with differing physical disabilities and with a wide range of functions. Diagnostic categories were not found to be significant factors affecting the children's participation; however, factors such as age, gender, and functional abilities in the areas of cognition, communication, activities of daily living, and physical motor skills directly influenced the children's participation. In a more recent study, income was identified specifically as an environmental factor influencing participation (Law et al., 2006). Participation by children with physical disabilities was found to be less diverse in families reporting lower income. King et al. (2007) found that children's enjoyment of particular types of activities were related to their areas of competence, meaning that they reported enjoying the activities that they could do well more than those in which they were less skilled.

Definition of HFASD

HFASD encompasses children with an IQ in the normal range with a diagnosis of autism, Asperger's disorder (also

known as Asperger syndrome), or pervasive developmental disorders not otherwise specified (PDD-NOS; Siegel, Minshew, & Goldstein, 1996). The term *high functioning* refers to the IQ and does not denote fewer autistic characteristics or less severity of characteristics. It is possible that some children with high IQs classified as HFASD may have more severe autistic characteristics than children with lower IQs who are not classified as high functioning. The *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2000) classifies people with autistic disorder or Asperger's disorder as having impairments in social interaction; having restricted, repetitive, and stereotyped patterns of behavior, interests, and activities; and having impairments in social, occupational, or other areas of functioning. Children who have similar symptoms but do not meet the criteria for either disorder are commonly diagnosed with PDD-NOS.

The prevalence of autism spectrum disorders (ASD) in the United States is between 2 and 7 per 1,000 children in the past decade, and it is estimated that of the 4 million people born each year over the past 2 decades, up to 560,000 have ASD (CDC, 2008). This condition is identified as the second most common serious developmental disability after intellectual impairment. Specific data are not available for HFASD. Comorbidity or secondary conditions are to be expected with ASD and include a large number of medical conditions, psychiatric disorders, and behavioral and motor symptoms (Gillberg & Billstedt, 2000). Studies examining motor problems or clumsiness in children with ASD reveal rates from 50% to 100% (Ghazuiddin & Butler, 1998; Ghazuiddin, Butler, Tsai, & Ghazuiddin, 1994; Gillberg, 1989; Green et al., 2002; Hilton et al., 2007; Klin, Volkmar, Cicchetti, & Rourke, 1995; Manjiviona & Prior, 1995; Miyahara et al., 1997).

Participation of Children With HFASD

Orsmond, Krauss, and Seltzer (2004) studied peer relationships and participation in activities for 235 adolescents and adults with autism. They found that participation in social and recreational activities was greater in children who had greater independence in activities of daily living, a greater number of internalizing behavior problems, less impairment in reciprocal social interaction skills, a greater number of services received, greater maternal participation in activities, and inclusion while in school. Internalizing behaviors include traits such as being withdrawn and appearing lonely. It is confusing that children with these traits would have a higher level of participation. The authors suggested that people who are withdrawn may be able to be taken to social activities without active resistance, compared with those who actively avoid participation. The study also found higher rates of

participation in activities that did not require social interaction, common participation in organized events (formal activities), and less participation in casual social activities (informal activities). They also found that the people had greater feelings of loneliness, a poor understanding of their loneliness, and a lower quality of companionship in the friendships that they did have.

Life Satisfaction Issues in Children With HFASD

Church, Alisanski, and Amanullah (2000) examined the social, academic, and behavioral experiences of 40 children with Asperger's disorder who were between 3 and 15 years old. They found social skills to be the greatest life challenge and a source of frustration, anxiety, and confusion for the children. They found that most of the children "desperately wanted to fit in with their peer group but lacked the skills and social knowledge to do it" (p. 19). The study compared the children in different age groups and found that during the middle school ages, children expressed sadness, anxiety, and rejection. The older group of teenagers had increased anxiety, obsessive-compulsive tendencies, and behavioral challenges. In another study, Koning and Magill-Evans (2001) compared the social and language skills of 21 adolescent boys with Asperger's disorder to a control group of boys with similar age and IQ. Findings of this study indicated that adolescents with Asperger's disorder had significant deficits in social skills and in social perception. The study also found that, compared with the control group, the boys with Asperger's disorder had impairments in the ability to receive and interpret verbal and nonverbal language. Sixteen of the 21 boys with Asperger's disorder reported having virtually no friends. This study also showed that the boys with Asperger's disorder were aware of some of their deficits, and the researchers suggested that this awareness could cause them to be more susceptible to depression.

Method

The study attempted to answer the following questions:

1. How do patterns of participation in out-of-school activities compare between typically developing children and those with HFASD in the areas of diversity of activities, intensity or frequency of participation, the number of people with whom they participate, the variety of environments in which they participate, and the enjoyment they report from participation in each activity?
2. How do patterns of participation in out-of-school activities compare between age groups of children with HFASD in the areas of diversity of activities, intensity or frequency of participation, the number of people with whom they participate, the variety of environments in

which they participate, and the enjoyment they report from participation in each activity?

3. How do patterns of participation in out-of-school activities compare between autistic trait severity levels of children with HFASD in the areas of diversity of activities, intensity or frequency of participation, the number of people with whom they participate, the variety of environments in which they participate, and the enjoyment they report from participation in each activity?

This descriptive study examined patterns of out-of-school participation in a group of typically developing children 6 to 12 years old and a group with HFASD. It compared participation patterns between the two groups and between autism severity levels. Nonparametric procedures were used to identify the differences between the two groups and between the levels of severity. The research was conducted with appropriate confidentiality, safety, and ethical principles in accordance with institutional review board protocol.

Participants

Participants consisted of two samples of children between ages 6 and 12. One sample consisted of 52 children with HFASD and the other consisted of 53 typically developing children. Parents of each of the 105 participants answered demographic questions and completed Social Responsiveness Scale (SRS; Constantino & Gruber, 2005) questionnaires. All of the participants were born full term, had an IQ of at least 70, and were proficient in use of the English language. They had no history of cerebral palsy or any other diagnosed major neurologic condition, no history of hearing problems, and no current noncorrectible hearing or vision problems. The 53 typically developing children had no diagnosis of ASD, attention deficit or hyperactivity disorder, Tourette syndrome, anxiety disorder, or any other major neurological or behavioral disorder. The characteristics were stated per parent report. Whether or not the participant had characteristics consistent with an autism spectrum diagnosis was confirmed by observation and scores on the SRS. The inclusion criterion of IQ levels being in the typical range was based on parent report.

The participants were recruited through a voluntary convenience sample from five Midwestern states. The sample of children with HFASD was recruited through parent and professional contacts known by the principal investigator and through parent support group meetings, and information was distributed through contacting support group e-mail lists, newsletters for parents of children with ASD, and flyers about the study posted at sites of service providers for children with autism. The second sample of typically developing children was recruited 1 year later through information flyers and parent and professional contacts of the

research team. Similar characteristics were recruited in the control group participants regarding age group, developmental level, and gender to avoid variance that could not be controlled.

Assessment Measures

Children's Assessment of Participation and Enjoyment (CAPE; King et al., 2004) measures children's participation and enjoyment in 55 different formal and informal leisure activities for children. Children complete the CAPE in an interview format in which they report aspects of their participation in each of the activities within the previous 4 months. The CAPE is based on the World Health Organization's *International Classification of Functioning, Disability, and Health* (2001), which describes participation as involvement in life situations. The assessment divides children's participation into formal activities, which involve rules and have a formal leader, and informal activities, which involve little or no planning. The 55 activities within the assessment are also categorized into five activity types, consisting of recreational activities, active physical activities, social activities, skill-based activities, and self-improvement or educational activities.

The CAPE quantifies participation by five dimensions: diversity, intensity, with whom, where, and enjoyment.

- *Diversity* identifies the number of activities out of the 55 choices in which the child participated during the 4 months before the data collection.
- *Intensity* reports how often the child has participated in the activities over the past 4 months on a 7-point scale (1 = *once*, 2 = *twice*, 3 = *once per month*, 4 = *2–3 times per month*, 5 = *once per week*, 6 = *2–3 times a week*, 7 = *once daily or more*).
- *With whom* reports the breadth of with whom the activity is usually done on a 5-point scale (1 = *alone*, 2 = *with family members*, 3 = *with other relatives*, 4 = *with friends*, 5 = *with others*).
- *Where* reports where the activity is usually done on a 6-point scale (1 = *at home*, 2 = *at a relative's house*, 3 = *in your neighborhood*, 4 = *at school*, 5 = *in your community*, 6 = *beyond your community*).
- *Enjoyment* reports how much the child enjoys participating in the activity on a 5-point scale (1 = *not at all*, 2 = *not very much*, 3 = *somewhat, sort of*, 4 = *very much*, 5 = *love it*).

The CAPE was selected for this study because of its depth of analysis of participation in out-of-school activities. Normative data are in the process of being collected for the CAPE, so standards are not yet available (King et al., 2004). Intraclass correlation coefficients for the formal, informal, and total participation *diversity*, *intensity*, and *enjoyment*

scores of the CAPE ranged from .64 to .86, indicating sufficient test–retest reliability (Kirshner & Guyatt, 1985). King et al. (2007) reported in a study involving 427 children with physical disabilities between ages 6 and 15 that *intensity* and *enjoyment* scores were significantly correlated (although with small to moderate correlations) with environmental, family and child variables in expected ways. Predictions were also supported with respect to differences in mean scores for boys versus girls and children in various age groups, substantiating the construct validity of the CAPE.

The SRS (Constantino & Gruber, 2005), a quantitative measure of autistic social impairment traits, is a 65-item questionnaire for parents, teachers, or caregivers who have routinely observed children in their naturalistic social settings for a minimum of 2 months. The SRS generates scale scores for specific symptom domains as well as a singular total score for autistic social impairment, which is validated by factor, cluster, and latent class analysis (Constantino et al., 2004; Constantino & Todd, 2000). Total scores—both raw scores and *T* scores—indicate the severity of social impairment in the autism spectrum. Individual scores are derived on five treatment subscales, reflecting performance in the areas of social awareness, social cognition, social communication, social motivation, and autistic mannerisms. Higher total scores on the SRS indicate greater severity of social impairment. The *T* scores are grouped into three categories: normal, mild to moderate, and severe impairment.

The SRS exhibits nonsignificant correlations with IQ (Constantino et al., 2006) and a substantial agreement with the Autism Diagnostic Interview–Revised (Constantino, Davis, et al., 2003; Constantino et al., 2004), the “gold standard” for diagnosis per parent report. Parent-report scores on the SRS are highly heritable (Constantino, Przybeck, Friesen, & Todd, 2000), are continuously distributed in the general population (Constantino & Todd, 2003, 2005), and distinguish children with pervasive developmental disorders from those with other child psychiatric conditions (Constantino et al., 2000; Constantino, Hudziak, & Todd, 2003). Norms for the SRS have been published from a collection of standardization data involving 1,636 children ages 4 to 18 years, and psychometric properties (Constantino et al., 2000; Constantino, Davis, et al., 2003) for both parent- and teacher-report SRS in the general population are strong (Constantino & Gruber, 2005). Internal consistency was computed from teacher-report data for 195 schoolchildren ages 4 to 7 (Cronbach's $\alpha = .97$; Constantino et al., 2000). Examples of SRS test items are “is able to understand the meaning of other people's tone of voice and facial expressions” and “offers comfort to others when they are sad.”

Data Analysis

The data for the study were analyzed with SPSS for Windows, version 15.0 (SPSS, Inc., Chicago, IL). The Mann–Whitney *U* test (Portney & Watkins, 2000) was used to identify the differences between participation of the HFASD group and the control group and between HFASD with secondary conditions and those without. A Kruskal–Wallis one-way analysis of variance (Portney & Watkins, 2000) by ranks was used to compare the differences between participation patterns across levels of severity. A multivariate analysis of variance (MANOVA; Portney & Watkins, 2000) was used to examine differences across age groups and diagnostic categories.

Comparisons of CAPE scores between HFASD and control groups for the overall CAPE dimensions of *diversity*, *intensity*, *with whom*, *where*, and *enjoyment* were completed, using the Mann–Whitney *U* test. Then the comparisons of the dimensions of the various categories and types of activities were completed, consisting of *formal*, *informal*, *recreational*, *physical*, *social*, *skill-based*, and *self-improvement* activities.

Results

Chi-square analyses revealed no significant differences between gender or age category in the HFASD and typically developing children groups (Table 1). Among the HFASD sample, 85% (44 participants) were boys and 15% (8 participants) were girls. The sample of typically developing children consisted of 83% (44) boys and 17% (9) girls. The mean age of the HFASD group was 9.54, and 9.59 for the group of typically developing children. Most of the children in both groups were white (92% in the HFASD group and 91% in the typical group). Ethnic minorities of Spanish, Hispanic, or Latino heritage represented 6% of the HFASD group and 7% of the control group; American Indian or Alaskan participants composed 2% (1 participant) of each group.

Within the HFASD group, 56% (29 participants) were reported as having at least one secondary condition, and no

secondary conditions were identified in the control group. The most common secondary condition reported among the HFASD group was attention deficit hyperactivity disorder (35%), followed by anxiety disorder (10%), learning disability (8%), depression (4%), Tourette syndrome (4%), and epilepsy (2%).

Chi-square analyses revealed a significant difference between the income levels of the HFASD and control groups; the control group had a higher income. The top income group was then excluded from the data, and a second chi-square analysis was completed. From this analysis, no significant difference in income level was present between the two groups. A Mann–Whitney *U* comparison of the two groups (control and HFASD) between the CAPE dimension scores was subsequently undertaken. The results of this analysis followed the same pattern as the original analysis between the CAPE dimension scores, in which all income levels were included from the entire group (Table 2). From these results, it was concluded that the income-level difference did not significantly affect the participation results, and all participants remained in the analysis.

To obtain the score for *intensity*, the sum of item intensity scores (frequency of participation) was divided by the 55 possible items rather than the actual number of items in which the child participated. This method of calculation appeared to cause the *intensity* score to be affected by the number of activities the children did rather than truly measuring how often they engaged in the activities that they did. Therefore, a second *intensity* score, *intensity 2*, was calculated based only on the number of activities in which the child participated. On examination of this *intensity 2* score, no significant differences were seen between the children with HFASD and the control group. The *formal*, *recreational*, and *social* activities still had significant differences between the two groups.

Participation dimensions between the participants with HFASD who had secondary conditions were compared with those who had no secondary conditions using the Mann–Whitney *U* test. No significant differences were seen for any of the participation dimensions for any of the activity categories.

Comparison of the CAPE dimensions was performed across the SRS severity levels, which revealed significant differences between SRS severity levels and CAPE dimension scores, except for *enjoyment* (see Table 3). Mann–Whitney *U* post hoc analyses revealed significant differences between CAPE scores and two of the SRS severity level relationships (*typical* and *mild to moderate*, *typical* and *severe*), but not between the third (*mild to moderate* and *severe*) in all the CAPE categories except for *enjoyment*, which was not significant.

Table 1. Characteristics of Participants (N = 105)

Characteristic	HFASD Count	HFASD %	Control Count	Control %	χ^2	<i>df</i>
Gender						
Male	44	84.6	44	83	0.517	1
Female	8	15.4	9	17		
Age category, years						
6–8	19	36.5	21	39.6	0.942	2
9–10	18	34.6	17	32.1		
11–12	15	28.8	15	28.3		

Note. HFASD = high-functioning autism spectrum disorders. All *p* values are nonsignificant.

Table 2. Mann–Whitney *U* Comparison of CAPE Scores Between HFASD and Control Participants (*N* = 105)

CAPE Scores (# of items)	Diversity (Z Score)	Intensity	Intensity 2	With Whom	Where	Enjoyment
Overall (55)	-5.27***	-4.45***	-0.026	-3.63***	-3.13**	-0.045
Formal (15)	-2.02*	-2.98**	-3.19**	-2.92**	-3.02**	-2.23*
Informal (40)	-5.63***	-4.34***	-0.622	-3.79***	-3.19**	-0.301
Recreational (12)	-3.17**	-1.71	-2.46*	-2.69**	-3.14**	1.66
Physical (13)	-6.59***	-6.03***	-1.14	-2.66**	-2.21*	-0.555
Social (10)	-4.78***	-4.46***	-2.05*	-1.84	-2.31*	-0.516
Skill based (10)	-0.036	-0.049	-0.485	-0.181	-1.31	-0.055
Self-improvement (10)	-3.86***	-0.324	-0.299	-0.080	-1.16	-0.667

Note. CAPE = Children's Assessment of Participation and Enjoyment; HFASD = high-functioning autism spectrum disorders.

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

Because recruitment of the typically developing participants was matched by age groups to the HFASD participants rather than by exact age, analyses for age differences also used age groups rather than exact age. A MANOVA examining the differences between the means of the participation dimensions for age and HFASD and control showed significant differences for *diversity*, *intensity*, and *where*. Comparing the three age groups (6–8, 9–10, 11–12), the control group participation *diversity* and *intensity* increased in the older participants, and the HFASD group participation decreased. When *intensity 2* was used instead of the original *intensity* calculations, however, a significant difference was no longer seen between groups or for any activity categories. Means of *where* the children participated were significantly different but did not show a consistent pattern of reduction in rela-

tionship to the increase in age, as was seen with *diversity* and *intensity* (Table 4).

Discussion

Results from the CAPE assessment comparisons between the two groups indicate that the HFASD group participated in a more limited range of activities (*diversity*), participated in activities with a narrower group of other participants (*with whom*), and participated in activities in a narrower range of geographic locations (*where*; see Table 2). Given the understanding that participation in occupation actually enhances and improves health and well-being (Law et al., 1996, 1998, 2004), this finding is concerning for children with HFASD. Causality is not part of this analysis, but it is possible that

Table 3. Kruskal–Wallis Comparison of CAPE Scores With SRS Severity Levels (*N* = 105)

CAPE Categories (Max Possible)	SRS Severity Level	<i>N</i>	Median Score	χ^2	<i>df</i>	<i>p</i>
Overall <i>diversity</i> (55)	Typical	53	35	27.90	2	.000
	Mild to moderate	11	28			
	Severe	41	26			
Overall <i>intensity</i> (7)	Typical	53	2.78	20.04	2	.000
	Mild to moderate	11	2.18			
	Severe	41	2.11			
Overall <i>with whom</i> (5)	Typical	53	2.5	13.46	2	.001
	Mild to moderate	11	2.38			
	Severe	41	2.28			
Overall <i>where</i> (6)	Typical	56	2.90	9.91	2	.007
	Mild to moderate	11	2.70			
	Severe	41	2.59			
Overall <i>enjoyment</i> (5)	Typical	56	3.81	0.473	2	.790
	Mild to moderate	11	3.77			
	Severe	41	3.81			

Note. CAPE = Children's Assessment of Participation and Enjoyment; HFASD = high-functioning autism spectrum disorders; SRS = Social Responsiveness Scale. Post hoc analyses (Mann–Whitney *U*) revealed a significant difference between the CAPE scores and SRS severity levels between typical and both mild to moderate and severe but not between mild to moderate and severe.

Table 4. MANOVA Comparison of CAPE Scores Between Age Groups of HFASD and Control Participants (N = 105)

CAPE Overall Dimensions	Diagnostic Group	Age Group	Mean Score	F	df	p
<i>Diversity</i> (55)	Control	6–8	32.38	4.47	2	.014
		9–10	34.59			
		11–12	37.27			
	HFASD	6–8	28.32			
		9–10	25.44			
		11–12	23.20			
<i>Intensity</i> (7)	Control	6–8	2.67	6.98	2	.001
		9–10	2.68			
		11–12	3.26			
	HFASD	6–8	2.42			
		9–10	2.12			
		11–12	1.82			
<i>With whom</i> (5)	Control	6–8	2.52	0.882	2	.417
		9–10	2.51			
		11–12	2.52			
	HFASD	6–8	2.26			
		9–10	2.40			
		11–12	2.21			
<i>Where</i> (6)	Control	6–8	2.81	3.66	2	.029
		9–10	2.76			
		11–12	3.10			
	HFASD	6–8	2.47			
		9–10	2.80			
		11–12	2.67			
<i>Enjoyment</i> (5)	Control	6–8	3.85	1.08	2	.343
		9–10	3.76			
		11–12	3.80			
	HFASD	6–8	3.92			
		9–10	3.85			
		11–12	3.54			

Note. CAPE = Children’s Assessment of Participation and Enjoyment; HFASD = high-functioning autism spectrum disorders; MANOVA = multivariate analysis of variance. Hotelling’s Trace = .017, Wilks’s lambda = .016 (Portney & Watkins, 2000).

the inhibited participation of the HFASD children may contribute to their lack of opportunity for development of social skills and, conversely, that the lack of social skills may contribute to their limited participation. However, based on the premise that participation in activities is where children form friendships, develop skills and competencies, express creativity, achieve mental and physical health, and determine meaning and purpose in life (Law & King, 2000), participation would be the vehicle for development of their social skills. Differences regarding severity levels of children with HFASD showed no additional differentiation between participation patterns of children with mild to moderate or severe levels of severity of autistic traits, even though they did substantiate the differences between children with HFASD and typically developing children. These findings may be related to the specific SRS score distribution of the participants in this study rather than being representative of the larger population of individuals with HFASD. Among the HFASD participants, only 11 had scores in the mild-to-

moderate level category, compared with 41 in the severe level category. In addition, the mild-to-moderate group had SRS *T* scores in the upper two-thirds (i.e., the more severe end) of the category. Future research needs to clarify the true nature of this relationship in the larger population.

Because no significant differences were seen between the participation dimensions of those children with HFASD who had secondary conditions, such as attention deficit hyperactivity disorder, and those who did not, it appears that the presence of secondary conditions was not related to the lower participation levels. The differences between participation by age group suggest that *diversity* of participation in out-of-school activities reduces as children get older, unlike the pattern seen in their typically developing counterparts, which increases as they get older. Previous studies have found that older children with Asperger’s disorder express feelings of sadness, frustration, anxiety, and rejection (Church et al., 2000) and feelings of loneliness (Orsmond et al., 2004) and that awareness of their social deficits could cause them to be more susceptible to depression (Koning & Magill-Evans, 2001). The reduced participation seen in the older children may offer some explanation for these indicators of unhappiness.

The general lack of differences between the two groups for *enjoyment* means that both groups report similar levels of *enjoyment* of the activities in which they participate. On the one hand, this finding indicates that the children with HFASD report receiving the same amount of enjoyment benefit as typically developing children from each of the activities that they do. On the other hand, however, it does not address the questions “do the children who participate in a greater diversity of activities have greater enjoyment in life?” or “are the children with HFASD satisfied with the activities in which they participate, or would they prefer to have a larger repertoire of activities?” These would be good questions for future studies to address. It is possible that the reduced out-of-school participation in comparison to their typical peers may be related to these indications of decreased feelings of well-being in the previously mentioned studies of older children with ASD (Church et al., 2000; Koning & Magill-Evans, 2001; Orsmond et al., 2004).

Children with HFASD were more similar to typically developing children in their *diversity* of participation in *formal* activities than in *informal* activities. This finding supports similar findings of Orsmond et al. (2004). It is possible that participating in the more formal activities does not involve the social initiative or motivation that it would take to initiate more spontaneous informal activities. It is also possible that children with HFASD may be more apt to participate in formal activities because they may be involuntary participants as a result of parental decisions, such as

parents signing them up for music lessons or team sports. In the analysis of the actual frequency of participation of these activities (*intensity 2*), the children with HFASD participated less than the typically developing children in *formal* activities. It is interesting that the *formal* activity category was the only category in which the children with HFASD enjoyed participating in the activities significantly less than the typically developing children did. This finding suggests that the participation may not be self-initiated.

Recreational activities showed similar patterns of significance in participation dimensions between the HFASD and typically developing children to those of *informal* activities. One explanation could be that all the items classified in *recreational* activities are also categorized as *informal*. They include activities such as doing puzzles, doing crafts, collecting things, going for a walk, and playing computer or video games, which are generally done spontaneously, rather than planned and organized by a leader, and they are activities that can be done alone. Even though the typically developing children participated in more of these activities, more frequently, with more other participants in a broader group of places, that category of activities was the only one that was enjoyed more (though not significantly) by the HFASD group than by the typical group (Table 2.) Perhaps their informal and solitary nature explains the greater enjoyment experienced by the HFASD group.

Children with HFASD participated in fewer *social* activities with less frequency than did the typically developing children. This finding appears reasonable, considering the difficulty with social skills of the HFASD population. This finding suggests the potential importance of promotion of social skills for people with HFASD as an intervention to support their participation in a greater diversity of social activities, which might ultimately help reduce their feelings of loneliness and depression.

Physical activities showed the greatest differences between the children with HFASD and the typically developing children among any of the activity categories in both the number of activities in which they participate and the frequency. It is possible that these differences are related to motor impairment issues in children with HFASD, which was supported by several studies (Ghazuiddin & Butler, 1998; Ghazuiddin et al., 1994; Gillberg, 1989; Green et al., 2002; Hilton et al., 2007; Klin et al., 1995; Manjiviona & Prior, 1995; Miyahara et al., 1997). The use of motor skills tends to be a common aspect of *physical* activities, and this finding suggests the importance of motor skills for participation in these activities and the value of intervention that addresses motor skills for children with HFASD. King et al. (2007) found that among 427 children with physical disabilities, their *enjoyment* of particular types of activities was related to their competence.

Perhaps the children with HFASD in this study choose not to participate in the activities in which they have less competence, so that differences in *social* and *physical* activity participation *diversity* are seen, rather than differences in *enjoyment*.

No significant differences were found in any of the *skill-based* activity dimensions between groups. *Skill-based* activities consist of swimming, doing gymnastics, horseback riding, learning to sing, taking art lessons, learning to dance, playing a musical instrument, taking music lessons, participating in community organizations, and dancing. All except dancing are also categorized as formal activities—that is, activities that are planned, have rules, and have a designated leader. They also appear to be activities that, for children between ages 6 and 12, would often be organized by parents, which might explain the lack of differences between groups.

Self-improvement activities showed a significant difference between groups for *diversity* but not for other dimensions; the children with HFASD participated in fewer of these activities than the typically developing children, but the other dimensions were the same. Self-improvement activities consist of writing letters, writing a story, getting help from a tutor, doing a religious activity, going to the public library, reading, doing volunteer work, doing a chore, doing homework, and shopping. For these activities in the age group examined, it is possible that the patterns of their participation, such as how often, with whom one does it, and where one does it, tend to follow certain socially consistent or standard patterns for this age group, such as doing homework alone every day at home and going shopping or doing a religious activity with family once a week, which could explain the lack of difference between groups.

Limitations of the Study

This study is limited in the fact that it is a descriptive analysis and can illuminate relationships, but it does not allow us to make causal inferences from the data. Another limitation is the use of questionnaire format assessments. The accuracy of the results is dependent on the accuracy of the child's and parent's ability to understand the questions and how to answer them accurately. The participants were also a convenience sample that was recruited from a limited section of the country and had little ethnic diversity, and the group with a severe level of autistic characteristics was quite a bit larger than the group with a mild to moderate level.

Implications for Future Research

This study provides insight into participation patterns of children with HFASD, but it evokes more questions than it answers. Building on the finding that little significant difference exists between how much typically developing children

and children with HFASD enjoy the activities in which they participate, an important increase in understanding could be gained from examining the enjoyment or feelings of well-being or self-efficacy related to participation in these same groups of children. It would also be useful to use a qualitative design to describe reasons for the limited diversity of their out-of-school activities. Other studies have addressed this for children with physical disabilities, but little has been examined for children with HFASD. The impact of increasing competence and participation in out-of-school activities for children with HFASD, perhaps through intervention programs, would also add to this line of understanding. Once standardization has been completed on the CAPE, interpretation of the scores will be more feasible. Other relationships between various areas of dysfunction seen in children with HFASD, such as sensory processing with motor skills or sensory processing with participation, would expand the understanding of this condition and its characteristics. This knowledge would, in turn, add a greater depth of understanding regarding implications for assessment and intervention for these children.

Conclusion

This study has provided a clearer understanding of the difference in out-of-school participation patterns between typically developing children and children with HFASD. The HFASD group participated in a more limited range of activities, participated in activities with a narrower range of other participants, and participated in activities in a narrower range of geographic locations than did the typically developing children. The general lack of differences in *enjoyment* between the two groups means that both groups reported similar levels of *enjoyment* of the activities in which they participate, but the implications for life satisfaction are not clear. Children with HFASD were more similar to typically developing children in their *diversity* of participation in *formal* activities than in *informal* activities. Regarding specific categories of activities, the greatest differences between the numbers of activities participated in by the two groups were seen in *physical*, *social*, *self-improvement*, and *recreational* activities. No significant differences were seen between the participation dimensions of those children with HFASD who had secondary conditions. The decreased number of activities participated in by the older children with HFASD, compared with an increased number in the typically developing children, suggests the possible benefit of intervention at an early age to address the deficient skill areas, such as social and motor, that may be related to the limited participation. The results of this study

suggest the importance of occupational therapists' addressing the out-of-school participation patterns of children with HFASD and the skills that may be related to participation, particularly the area of social competence, that would, in turn, contribute to their long-term mental and physical health. ▲

Acknowledgments

We are thankful to Kate Graver, Jessica Reinken Johnson, Lyndsay Wente, Andrea Runzi Lang, and Nicolle Drew Callier for their tireless commitment to the completion of the data collection. We thank Mallory Wheeler and Rachel Holmes Kueker for their extensive work on data entry. We also thank Betty Schaefer, Cathy Crouch, Valerie Harbolovic, Sonia O'Donnell, Lynda Cordry, Tami Morrissey, Deb Dolan, Nancy Vanderweile Milligan, Jackie Kilburn, Lois Ehrhard, Joan Smith, Tina Kreummel, Nancy Buchholz, Lori Thompson, Marla Johnson, Lou Pruitt, and Kathy List for their help in finding participants and coordinating test sites. We thank John Constantino, Patti LaVesser, Diane Smith, Max Ito, Carol Reed, Georgiana Herzberg, and William Siler for their help with problem solving and statistical analysis. We especially thank the many wonderful mothers, fathers, and children who volunteered to participate in the study, many of whom traveled several hours to the test sites.

References

- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., Text rev.). Washington, DC: Author.
- Centers for Disease Control & Prevention. (2008). *Autism information center*. Retrieved May 1, 2008, from www.cdc.gov/ncbddd/autism/
- Church, C., Alisanski, S., & Amanullah, S. (2000). The social, behavioral, and academic experiences of children with Asperger syndrome. *Focus on Autism and Other Developmental Disabilities, 15*, 12–20.
- Constantino, J. N., Davis, S., Todd, R., Schindler, M., Gross, M., Brophy, S., et al. (2003). Validation of a brief quantitative measure of autistic traits: Comparison of the Social Responsiveness Scale with the Autism Diagnostic Interview-Revised. *Journal of Autism and Developmental Disorders, 33*, 427–433.
- Constantino, J., & Gruber, C. (2005). *Social responsiveness scale*. Los Angeles: Western Psychological Services.
- Constantino, J. N., Gruber, C. P., Davis, S., Hayes, S., Passanante, N., & Przybeck, T. (2004). The factor structure of autistic traits. *Journal of Child Psychology and Psychiatry, 45*, 719–726.
- Constantino, J. N., Hudziak, J. J., & Todd, R. D. (2003). Deficits in reciprocal social behavior in male twins: Evidence for a

- genetically independent domain of psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry*, 42, 458–467.
- Constantino, J. N., Lajonchere, C., Lutz, M., Gray, T., Abbacchi, A., McKenna, K., et al. (2006). Autistic social impairment in the siblings of children with pervasive developmental disorders. *American Journal of Psychiatry*, 163, 294–296.
- Constantino, J. N., Przybeck, T., Friesen, D., & Todd, R. D. (2000). Reciprocal social behavior in children with and without pervasive developmental disorders. *Journal of Developmental Behavioral Pediatrics*, 21, 2–11.
- Constantino, J. N., & Todd, R. D. (2000). Genetic structure of reciprocal social behavior. *American Journal of Psychiatry*, 157, 2043–2045.
- Constantino, J. N., & Todd, R. D. (2003). Autistic traits in the general population: A twin study. *Archives of General Psychiatry*, 60, 524–530.
- Constantino, J. N., & Todd, R. D. (2005). Intergenerational transmission of subthreshold autistic traits in the general population. *Biological Psychiatry*, 57, 655–660.
- Ghazuiddin, M., & Butler, E. (1998). Clumsiness in autism and AS: A further report. *Journal of Intellectual Disability Research*, 42(Pt. 1), 43–48.
- Ghazuiddin, M., Butler, E., Tsai, L., & Ghazuiddin, N. (1994). Is clumsiness a marker for AS? *Journal of Intellectual Disability Research*, 38, 519–527.
- Gillberg, C. (1989). Asperger syndrome in 23 Swedish children. *Developmental Medicine and Child Neurology*, 31, 520–531.
- Gillberg, C., & Billstedt, E. (2000). Autism and Asperger syndrome: Coexistence with other clinical disorders. *Acta Psychiatrica Scandinavica*, 102, 321–330.
- Green, D., Baird, G., Barnett, A., Henderson, L., Huber, J., & Henderson, S. (2002). The severity and nature of motor impairment in Asperger syndrome: A comparison with specific developmental disorder of motor function. *Journal of Child Psychology and Psychiatry*, 43, 655–668.
- Hilton, C. L., Wente, L., LaVesser, P., Ito, M., Reed, C., & Herzberg, G. (2007). Relationship between motor skill impairment and severity in children with Asperger syndrome. *Research in Autism Spectrum Disorders*, 1, 339–349.
- King, G. A., Law, M., King, S., Hurley, P., Hanna, S., Kertoy, M., et al. (2007). Measuring children's participation in recreation and leisure activities: Construct validation of the CAPE and PAC. *Child: Care, Health and Development*, 33, 28–39.
- King, G., Law, M., King, S., Hurley, P., Rosenbaum, S. H., Kertoy, M., et al. (2004). *Children's Assessment of Participation and Enjoyment and Preferences for Activities of Children (CAPE/PAC) manual*. San Antonio, TX: Psychological Corp.
- Kirshner, B., & Guyatt, G. (1985). A methodological framework for assessing health indices. *Journal of Chronic Diseases*, 38, 27–36.
- Klin, A., Volkmar, F., Cicchetti, D., & Rourke, B. (1995). Validity and neuropsychological characterization of Asperger syndrome: Convergence with non-verbal learning disabilities syndrome. *Journal of Child Psychology and Psychiatry*, 36, 1127–1140.
- Koning, C., & Magill-Evans, J. (2001). Social and language skills in adolescent boys with Asperger syndrome. *Autism*, 5, 23–36.
- Larson, R. (2000). Toward a psychology of positive youth development. *American Psychologist*, 55, 170–183.
- Larson, R. W., & Verma, S. (1999). How children and adolescents spend time across the world: Work, play, and developmental opportunities. *Psychological Bulletin*, 125, 701–736.
- Law, M., Cooper, B., Strong, S., Stewart, D., Rigby, P., & Letts, L. (1996). The person–environment–occupation model: A transactive approach to occupational performance. *Canadian Journal of Occupational Therapy*, 63, 9–23.
- Law, M., Finkelman, S., Hurley, P., Rosenbaum, P., King, S., King, G., et al. (2004). Participation of children with physical disabilities: Relationships with diagnosis, physical function, and demographic variables. *Scandinavian Journal of Occupational Therapy*, 11, 156–162.
- Law, M., & King, G. (2000). Participation! Every child's goal. *Today's Kids in Motion*, 1, 10–12.
- Law, M., King, G., King, S., Kertoy, M., Hurley, P., Rosenbaum, P., et al. (2006). Patterns of participation in recreational and leisure activities among children with complex physical disabilities. *Developmental Medicine and Child Neurology*, 48, 337–342.
- Law, M., Steinwender, S., & Leclair, L. (1998). Occupation, health, and well-being. *Canadian Journal of Occupational Therapy*, 65, 81–91.
- Lawlor, M. C. (2003). The significance of being occupied: The social construction of childhood occupations. *American Journal of Occupational Therapy*, 57, 424–434.
- Manjiviona, J., & Prior, M. (1995). Comparison of Asperger syndrome and high-functioning autistic children on a test of motor impairment. *Journal of Autism and Developmental Disorders*, 25, 23–39.
- Miyahara, M., Tsujii, M., Hori, M., Nakanishi, K., Kageyama, H., & Sugiyama, T. (1997). Brief report: Motor incoordination in children with Asperger syndrome and learning disabilities. *Journal of Autism and Developmental Disorders*, 27, 595–603.
- Orsmond, G., Krauss, M., & Seltzer, M. (2004). Peer relationships and social and recreational activities among adolescents and adults with autism. *Journal of Autism and Developmental Disorders*, 34, 245–256.
- Portney, L. G., & Watkins, M. P. (2000). *Foundations of clinical research: Applications to practice* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.
- Siegel, D. J., Minshew, N. J., & Goldstein, G. (1996). Wechsler IQ profiles in diagnosis of high-functioning autism. *Journal of Autism and Developmental Disorders*, 26, 398–406.
- Tinsley, H., & Eldredge, B. (1995). Psychological benefits of leisure participation: A taxonomy of leisure activities based on their need-gratifying properties. *Journal of Counseling Psychology*, 42, 123–132.
- Wilcock, A. A. (1993). A theory of the human need for occupation. *Journal of Occupational Science*, 1, 17–24.
- World Health Organization. (2001). *International classification of functioning, disability and health*. Retrieved on August 29, 2006, from www3.who.int/icf