

# Perceived Environmental Barriers to Recreational, Community, and School Participation for Children and Youth With Physical Disabilities

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**ABSTRACT.** Law M, Petrenchik T, King G, Hurley P. Perceived environmental barriers to recreational, community, and school participation for children and youth with physical disabilities. *Arch Phys Med Rehabil* 2007;88:1636-42.

**Objective:** To comprehensively describe parent perceptions of environmental barriers to recreational, community, and school participation for children with physical disabilities.

**Design:** Secondary analysis of cross-sectional data gathered in the first wave of a longitudinal study of the child, family, and environmental factors affecting the recreational and leisure participation of school-age children with physical disabilities.

**Setting:** General community.

**Participants:** Parent-child pairs (N=427). Child participants included 229 boys and 198 girls with physical disabilities in 3 age cohorts (6–8, 9–11, 12–14y).

**Interventions:** Not applicable.

**Main Outcome Measure:** Craig Hospital Inventory of Environmental Factors.

**Results:** Barriers to participation were encountered in school and work environments ( $1.54 \pm 1.88$ ), physical and built environments ( $1.36 \pm 1.35$ ), within institutional and government policies ( $1.24 \pm 1.71$ ), services and assistance ( $1.02 \pm 1.2$ ), and attitudes and social support ( $.87 \pm 1.17$ ). Age, socioeconomic status, level of physical functioning, and behavioral difficulties were related to the impact of barriers reported in certain areas. No significant differences by the sex of the children or rural versus urban community were found.

**Conclusions:** Parents report environmental barriers in several areas, providing valuable information about the environmental factors that support or hinder participation while showing the complexity of these issues. Future research is required to further identify potential avenues for intervention.

**Key Words:** Barriers, architectural; Children with disabilities; Leisure activities; Rehabilitation.

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**P**ARTICIPATION IS FUNDAMENTALLY important to children's development. The World Health Organization<sup>1</sup> defines participation as "involvement in a life situation" and

regards it as an essential aspect of child health and well-being. Through participation, children learn about the expectations of society; learn to communicate and get along with others; build friendships; and develop the skills and competencies they need to become successful in their homes, communities, and in life.<sup>2-4</sup>

Participation in recreational activities helps with motor-skill development and is linked to health benefits such as improved cardiovascular fitness and lower rates of obesity.<sup>5-7</sup> Participation in organized out-of-school activities has been shown to benefit children's emotional well-being, life satisfaction, school engagement, peer relations, and academic outcomes.<sup>4,8</sup> For children living in high-risk environments (eg, poverty, high crime neighborhoods), participation in structured activities has been shown to reduce behavioral and emotional problems.<sup>8</sup>

Children's participation is potentially affected not only by their functional abilities, skills, interests, and family culture but also by factors within their physical, social, and institutional environments.<sup>9-12</sup> Several studies<sup>1,13-17</sup> have shown that participation among children with disabilities is more restricted when compared with children without disabilities. Despite recognition that the nature and extent of children's participation is strongly influenced by children's everyday environments,<sup>18-20</sup> relatively little research has focused on identifying and describing differences in environmental barriers to participation for children with disabilities. This article aims to add to a relatively small knowledge base on this topic by comprehensively describing parent perceptions of environmental barriers to recreational, community, and school participation for children with disabilities.

As conceptualized in the child and youth version of the *International Classification of Functioning*,<sup>20</sup> 5 aspects of the environment may influence a child's participation: (1) products and technology; (2) the natural and built environment; (3) support and relationships; (4) attitudes, values, and beliefs; and (5) services systems and policies. Empirical studies of the participation of children with disabilities, although few in number, have shown environmental factors can and often do impede a child's social and activity participation at home, school, and in the community. The characteristics (eg, temperature, terrain, lighting, noise, crowding); design; and accessibility of home, school, and community environments can pose significant barriers to participation for children with physical disabilities.<sup>9,11,21,22</sup> At the community level, fewer municipal resources and public services (eg, inclusive schools, transportation, recreation programs, programs with adaptive equipment) have been shown to impede the community participation of children with physical disabilities.<sup>23,24</sup> Hammal et al<sup>10</sup> found regional differences in the participation of children with cerebral palsy (CP) based on the districts in which they lived, after controlling for the type and severity of a child's disability. Similarly, Welsh et al<sup>22</sup> have shown that the social participation of children with disabilities is enhanced when communities have a greater number of accessible and accommodating facilities.

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Supported by the U.S. National Institutes of Health (grant no. HD38108-02).

No commercial party having a direct financial interest in the results of the research supporting this article has or will confer a benefit upon the author(s) or upon any organization with which the author(s) is/are associated.

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0003-9993/07/8812-00124\$32.00/0

doi:10.1016/j.apmr.2007.07.035

Attitudinal factors and a lack of social support are relatively potent barriers to participation for children with physical disabilities.<sup>9,25</sup> Bullying, social segregation, and marginalization sometimes encountered by children with disabilities can leave a child feeling isolated and wary of participation.<sup>23</sup> Conversely, social environments, including schools, encourage participation when they work to minimize obstacles faced by children with disabilities by promoting caring relationships, buddy systems among peers, and welcoming attitudes in recreational activities.<sup>8,9,26</sup>

Institutional-level barriers may include exclusionary policies and programming, the absence or inaccessibility of needed resources and information, and barriers resulting from socioeconomic disparities. Hammal et al<sup>10</sup> found that children's participation at school improved within schools that favored inclusion.

Despite findings by Mihaylov et al<sup>23</sup> that families of children with disabilities have less earned income in comparison with families without such children, few studies have examined the association between family income and participation for children with disabilities. An exception is a study by Finch et al<sup>27</sup> that showed family income, or a lack of disposable income, to be a chief barrier to using local sport and leisure facilities for children with physical disabilities. King et al<sup>26</sup> also showed a significant indirect influence of income on the participation of children with physical disabilities.

In summary, few, if any, studies have described similarities and differences in perceived environmental barriers to recreational, community, and school participation for a large group of school-age children with a range of health conditions and disabilities. To our knowledge, this is the first study to describe such differences for boys and girls with a range of functional abilities in 3 developmentally significant age cohorts across a range of activity settings. Based on theoretic propositions,<sup>19</sup> our own research,<sup>4,17,26,28</sup> and the empirical works cited, we expected the impact of barriers to vary according to a child's age, sex, level of physical functioning (PF), degree of behavioral difficulties, and by type of community residence (eg, large urban, small urban, or rural).

## METHODS

The analysis reported here used cross-sectional data gathered in the first wave of a longitudinal study of child, family, and environmental factors affecting the recreational and leisure participation of school-age children with physical disabilities.<sup>8,26</sup> Ethics approval for the study was obtained from McMaster University. Data collection on a sample of 427 children with physical disabilities and a parent respondent occurred in 3 waves at 9-month intervals during 2001 to 2003. The sample was randomly drawn from 11 publicly funded regional children's rehabilitation centers and a children's hospital in the province of Ontario, Canada. A full description of sampling and recruitment procedures is reported elsewhere.<sup>8,29</sup>

The first wave of data collection included a package of self-administered questionnaires that was mailed to the family before a home visit. The measures and the interview were completed with the child and with a parent who nominated themselves as most knowledgeable about their child's daily activities. The parent-completed measures included reports of parent and child health; family cohesion and activity preferences, social supports, demographic information, and assessments of the child's behavioral health status; social development and social support; and parent-reported perceptions of environmental barriers to their child's participation. The child completed assessments of his/her physical functional abilities

**Table 1: Characteristics of the Child Respondents (N=427)**

Characteristic	Frequency	Valid %
Sex		
Male	229	53.6
Female	198	46.4
Age (y)		
6–8	125	29.3
9–11	176	41.2
12–14	126	29.5
Primary health and development problem		
CP or related (CNS)	217	50.8
Spina bifida, spinal cord	52	12.2
Acquired brain injury	25	5.9
Developmental delay	12	2.8
CNS minor motor	19	4.4
CNS: other	15	3.5
Neuromuscular	20	4.7
Skeletal	54	12.7
Musculoskeletal: other	13	3.1
Missing	2	NA
Ethnic background		
Asian (East and Southeast)	28	6.6
Asian (Arab/West)	8	1.9
Black	28	6.6
White	345	81.4
Hispanic	9	2.1
Native	6	1.4
Missing	3	NA

Abbreviations: CNS, central nervous system; NA, not applicable

as well as measures of his/her recreational and leisure activity participation and activity preferences.

## Participants

Study participants included 427 parent-child pairs (1 pair per family). Child participants included 229 boys and 198 girls with physical disabilities in 3 age cohorts (6–8, 9–11, 12–14y). The majority of children (41%) were between 9 and 11 years old. As shown in table 1, the children had a range of health and developmental problems, with 51% of the sample having a diagnosis of CP. Most parent respondents were mothers (89%) in 2-parent families (83%) with 4 or more household members (86%). Participants were predominantly white (81%). At the time of data collection, over half of the families lived in major urban areas in Ontario, whereas 32% lived in smaller cities and 18% lived in small towns or rural areas. Just over half (51%) of the families reported annual incomes of less than Can \$60,000 (table 2). The median family income in the province of Ontario at the time of data collection was Can \$61,000.<sup>30</sup>

We assessed the behavioral and PF of children in the sample. Nearly one third (n=116) met the clinical criteria for significant behavioral problems by scoring 17 or above on the Strengths and Difficulties Questionnaire (SDQ).<sup>31</sup> The children had a mean summary score of 70.3 on the Activity Scale for Kids (ASK).<sup>32,33</sup> This level of PF is similar to that reported for a group of 200 children with musculoskeletal limitations who had a mean ASK score of 68.2.<sup>33</sup>

## Measurement

**Environmental barriers.** Barriers to participation were measured by using the Craig Hospital Inventory of Environmental

**Table 2: Demographic Characteristics of Parent Respondents and Families (N=427)**

Characteristic	Frequency	%
Age (y)		
20–29	19	4.5
30–39	154	36.2
40–49	218	51.2
50–59	35	8.2
Missing	1	NA
Sex		
Male	48	11.3
Female	375	88.7
Missing	4	NA
Educational attainment of respondent		
Completed elementary, some high school	47	11.0
Completed high school, some college/technical training	137	32.2
Completed college/technical training, some university	138	32.4
Completed university	104	24.4
Missing		
Total family income (Can \$)		
<29,999	68	16.1
30,000–44,999	30	18.7
45,000–59,999	74	17.5
60,000–89,999	114	27.0
>90,000	87	20.6
Missing	5	NA

Factors (CHIEF).<sup>34</sup> The CHIEF was designed to capture 5 characteristics of the environment known to impede or facilitate participation for people with a disability: accessibility, accommodation, resource availability, social support, and equality. The questionnaire consists of 25 items divided into 5 subscales that measure attitudes and support, services and assistance, physical and structural, policy and work, and school environmental barriers. Parents are asked to indicate the degree to which each item posed a barrier or limitation to their child's participation in school and work; the community; and in recreational, social, and civic activities.

The CHIEF uses 2 types of response scales: one for frequency of an identified barrier and one for the magnitude of the barrier. The frequency scale uses a 5-point Likert scale to capture frequency of the barrier ranging from "daily" to "never." The magnitude scale, designed to assess the extent of the barrier, uses a dichotomous scale of "big problem" or "little problem." The CHIEF uses 3 methods of scoring for each item: (1) a frequency score on a scale of 0 to 4 indicating the frequency with which barriers are encountered, (2) a magnitude score on a scale of 1 to 2 indicating the size of the problem, and (3) a frequency-magnitude product score on a scale of 0 to 8 calculated as the product of the frequency score and the magnitude score indicating the overall impact of the barrier. In this article, we report frequency-magnitude product scores or overall impact scores. The CHIEF has good test-retest and internal consistency reliability and evidence of content, construct, and discriminant validity.<sup>35</sup> Although originally designed for use with adults, the CHIEF was used in this study as a parent report measure of environmental barriers to their children's participation.<sup>26</sup>

The CHIEF subscales measure a range of environmental characteristics. The school and work subscale measures 3 di-

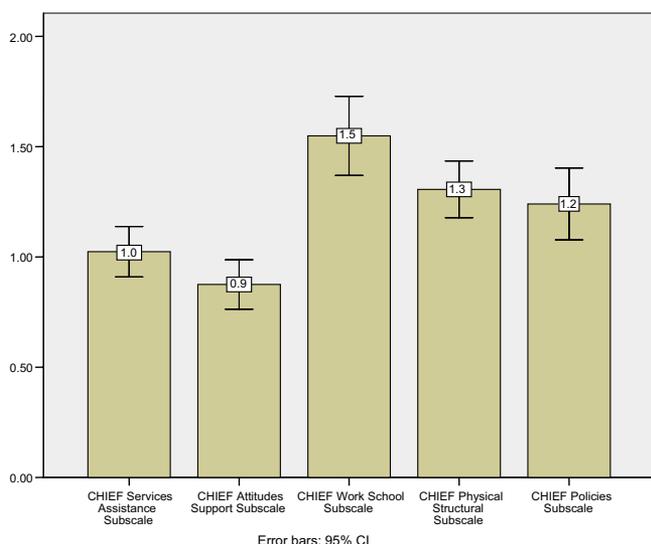
mensions of school and work environments, including the relative ease or difficulty of obtaining the help of others, the degree to which other people's attitudes are a problem, and the extent to which a lack of support and encouragement from others is problematic for a child or youth. The physical and structural subscale measures the extent to which the characteristics, design, and layout of a child's home, school and/or work environment, and community pose a barrier to participation. The policies subscale measures multiple characteristics of the institutional (eg, organizations, school, businesses) and political environment, including a lack of programs and services, unsupportive government programs and policies, and barriers imposed by policies and rules. The services and assistance subscale measures the availability of resources such as transportation, health care services, medical care, personal equipment, and adapted devices as well as the availability of information, training, and assistance in the child's home and community. The attitudes and support subscale measures the extent to which people's attitudes and a lack of support and encouragement from others at home and in the community pose a barrier to participation.

**Child PF.** PF was measured by using the ASK.<sup>32</sup> The ASK is a 30-item child report measure that provides a total score of physical disability in children 5 to 15 years of age. The ASK measures a child's ability to perform daily tasks such as personal care, dressing, eating and drinking, and play. Questions are scored based on whether a child can do an activity independently none of the time (0), once in a while (1), sometimes (2), most of the time (3), or all of the time (4). Scores range between 0 to 100; 0 indicates extreme disability. The ASK has excellent reliability (internal consistency, test-retest, interrater, intrarater reliabilities of  $\geq .94$ ) and good construct and criterion validity.<sup>33</sup>

**Child behavioral and emotional functioning.** This construct was measured by using a parent report version of the SDQ.<sup>31</sup> The SDQ is a brief behavioral screening questionnaire for children and youth 4 to 16 years of age. The questionnaire consists of 25 items organized into 5 scales of 5 items each. The scales generate scores for emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial behavior. Responses use a 3-point Likert scale ranging from "not true" to "certainly true." Summed scale scores generate a total difficulties score. The prosocial scale measures child strengths rather than difficulties and is, therefore, not included in the total difficulties score. The SDQ has good reliability (coefficients of .82 for total difficulty score; subscale coefficients range, .63–.77) and good content, criterion, and discriminant validity.<sup>31,36</sup>

## Data Analyses

Descriptive statistics (means and standard deviations [SDs]) were used to explore trends in parents' perceptions of environmental barriers to children's participation. A general linear modeling approach to multivariate analyses of covariance (MANCOVA) was used to determine the main and interaction effects of child age, sex, level of PF, degree of behavioral difficulties, and type of community residence on the impact of parent-reported barriers to childhood participation in 5 contexts (school and work, natural and built settings, policies, services and assistance, attitudinal). Because the linkage between family income and barriers to childhood participation is well established,<sup>37</sup> we tested and controlled for the effect of family income by including it as a covariate in the analysis. Pairwise comparisons with Bonferroni adjustment were used for between-subjects tests and to control the overall type I error rate. All reported *P* values are based on 2-tailed tests with signifi-



**Fig 1. Mean magnitudes of physical, social, institutional, and attitudinal barriers to participation as measured by the CHIEF (scale range, 0–8). NOTE. Error bars are the 95% confidence interval.**

cance set at the .05 level. SPSS software<sup>a</sup> was used for all statistical analyses.

**RESULTS**

Descriptive findings characterizing the impact of perceived barriers to participation in 5 environmental contexts are reported first. These are followed by a report of the main and interaction effects tested by using a MANCOVA comprised of 5 dependent variables (CHIEF subscales), 5 independent variables (child age, sex, level of PF, degree of behavioral difficulties, type of community residence), and a control variable (family income).

**Relative Impact of Perceived Barriers**

Figure 1 presents CHIEF mean product scale scores for perceived barriers reported in 5 environmental contexts. In descending order of impact, parents reported children encountered the greatest perceived barriers to participation in school and work environments (1.54±1.88) and in the natural and built environment (1.36±1.35). These were followed by barriers associated with institutional and government policies (1.24±1.71), services and assistance (1.02±1.2), and attitudes and social support (.87±1.17).

The MANCOVA results showed a significant main effect for child age (Wilks λ=.91, F<sub>1,390</sub>=3.67, P<.001), level of PF (Wilks λ=.77, F<sub>3,390</sub>=7.08, P<.001), and degree of behavioral difficulties (Wilks λ=.90, F<sub>1,390</sub>=8.2, P<.001). The interaction effect between child’s age and level of PF was significant. Neither the main nor interaction effects for child sex and type of community residence were significant.

**Age Effects**

As shown in table 3, post hoc between subjects comparisons showed that children in the 12- to 14-year age group experienced a significantly higher mean impact of barriers than children in the 6- to 8- and 9- to 11-year cohorts in the areas of service and assistance (P<.01, P<.05, respectively), attitudinal barriers (P<.001), school and work barriers (P<.01), and policy barriers (P<.05). Children 12 to 14 years old experienced a significantly higher mean impact of barriers in the natural and built environment in comparison to children in the 6- to 8-year age cohort (P<.001).

**PF Effects**

ASK scores range between 0 and 100, with higher scores indicative of better PF. For comparative purposes, continuous ASK scores were coded into 4 percentile groups (0–25, >25–50, >50–75, >75). As shown in table 4, there were significant differences in the impact of environmental barriers reported for children in the various ASK percentile groups. Children with ASK scores below the 25th percentile experienced a significantly higher impact of service and assistance barriers than children in the >25th- to 50th-, >50th- to 75th-, and >75th-percentile groups (all, P<.001). Children with ASK scores in the 25th percentile also experienced significantly higher impact of school and work barriers (P<.01) and policy barriers (P<.001) than children in the >75th-percentile group and significantly greater barriers in the natural and built environment than children in the >25th- to 50th-, >50th- to 75th-, and >75th-percentile groups (P<.01, P<.001, P<.001, respectively).

**Behavioral Difficulties Effects**

For comparative purposes, children were grouped in 2 behavioral functioning cohorts. Using Goodman’s clinical criteria<sup>36</sup> for determining caseness, continuous SDQ scores were dichotomized based on cutoff scores (≥17), which are indicative of significant behavioral difficulties. The upper range of cutoff scores was chosen to minimize false-positives. As shown in table 5, the group of children with SDQ scores at or above the threshold had significantly higher impact of reported service and assistance barriers (P<.01), attitudinal barriers

**Table 3: Mean Magnitude of Reported Barriers to Participation Grouped by Child Sex and Age**

Environmental Context	Total Sample (N=427)	Male (n=229)	Female (n=198)	6 to 8 Years (n=125)	9 to 11 Years (n=176)	12 to 14 Years (n=126)
Services and assistance*	1.02±1.20	0.98±1.09	1.08±1.32	0.86±1.14	0.97±1.14	1.25±1.32
Attitudes*	0.88±1.18	0.95±1.18	0.78±1.16	0.65±1.04	0.83±1.14	1.16±1.30
School and work*	1.55±1.88	1.73±2.06	1.34±1.63	1.31±1.67	1.47±1.66	1.90±2.30
Natural and built environment†	1.31±1.35	1.26±1.30	1.36±1.41	1.11±1.30	1.25±1.28	1.59±1.46
Policies*	1.24±1.71	1.36±1.77	1.10±1.64	1.08±1.64	1.18±1.60	1.48±1.90

NOTE. Values are mean ± SD.

\*Significant pairs of means for the 12- to 14-year age group in comparison with all other groups (P<.05).

†Significant pairs of means for the 12- to 14-year age group in comparison with 6- to 8-year age group (P<.001).

Table 4: Mean Magnitude of Reported Barriers to Participation by ASK Percentile Groups

Environmental Context	Percentiles				
	ASK Total (n=426)	0 to 25th (n=106)	>25th to 50th (n=108)	>50th to 75th (n=107)	>75th (n=105)
Services and assistance*	1.03±1.20	1.70±1.50	1.06±1.09	0.85±0.99	0.47±0.76
Attitudes	0.88±1.18	0.86±1.09	1.00±1.26	1.02±1.28	0.62±1.03
School and work†	1.56±1.88	1.89±1.94	1.46±1.70	1.75±2.14	1.10±1.64
Natural and built environment*	1.31±1.35	2.07±1.48	1.53±1.40	1.02±1.06	0.59±0.93
Policies†	1.24±1.71	1.84±2.02	1.33±1.68	1.23±1.71	0.55±1.06

NOTE. Values are mean ± SD.

\*Significant pairs of means for 25th-percentile group in comparison with all other groups ( $P<.01$ ).

†Significant pairs of means for 25th-percentile group in comparison with >75th-percentile group ( $P<.01$ ).

( $P<.001$ ), school and work barriers ( $P<.001$ ), and policy barriers ( $P<.01$ ).

### Age by PF Effects

There was a significant age by PF effect (Wilks  $\lambda=.89$ ,  $F_{3,390}=1.56$ ,  $P<.05$ ). Younger children with lower PF experienced higher barriers for 2 of the CHIEF subscales. Pairwise comparisons showed that children in the 9- to 11-year age cohort, whose ASK scores were in the 25th to 50th percentile, experienced the greatest impact of service and assistance barriers ( $P<.05$ ). Children in the 2 youngest age cohorts (6–8y and 9–11y), whose ASK scores were in the 25th to 50th percentile, experienced the greatest mean impact of attitudinal barriers ( $P<.05$ ).

## DISCUSSION

The findings described in this article represent one of few large empirical studies of parent's perceptions of environmental barriers to the participation of children with physical disabilities in out-of-school activities. The importance of participation as a major influence on child development is well established.<sup>3,5,7,38,39</sup> For children with physical disabilities, participation has been shown to be limited in comparison to children without disabilities.<sup>2,26</sup> King et al<sup>26</sup> found parents' perceptions of unsupportive physical, social, attitudinal, and institutional environments has a significant indirect effect on the out-of-school time activity participation of children and youth with physical disabilities.

In this study, parents' assessments of environmental barriers to their children's recreational, community, and school participation indicate participation restrictions occurred within and across multiple environmental contexts. The highest overall

impact of barriers was associated with school and work followed by the physical and structural environment and policies. The school and work barriers reported relate to the relative supportiveness of the social and attitudinal environments in these settings. Because children spend so much time in school, it is not surprising that barriers, when present, are perceived by parents as having a significant impact. In the absence of a peer buddy system or in the presence of bullying and social marginalization, children and youth find school participation challenging.<sup>12,37,39</sup> Additionally, the increased fiscal challenges being experienced by school boards in providing timely and effective services for children with disabilities may also lead to greater perceived barriers in schools.

The physical and structural barriers reported by parents pertain to the characteristics, design, and layout of built and natural environments, whereas the policy barriers relate to the availability of programs and services within a community. The role these environments may play, either as enablers or disablers of children's participation, is the subject of a growing body of research.<sup>9,11,18,21-24</sup> Almqvist and Granlund,<sup>12</sup> in a study of school participation of children and youth with disabilities, found that availability of environmental programs and supports significantly influenced participation. They also found a differential effect for this factor, with availability of supports more important when a child's autonomy and locus of control were lower.

Interestingly, the lowest impact of perceived barriers was general attitudes at home and in the community. Although this outcome is encouraging, it appears that these positive attitudes have not resulted in concrete programs and availability of required supports. These results differ slightly from the findings of Law et al,<sup>9</sup> Hemmingson and Borell,<sup>40</sup> and Pivik et al<sup>41</sup> who found that attitudes, institutional factors, and the physical environment were the most important barriers. This divergence may reflect increasing positive general attitudes toward disability that have not yet translated into substantive policy changes and support.

Perceived environmental barriers increased with age. Such changes occur as children move into adolescence and seek to expand their recreation and leisure activities beyond home and school. These findings also reflect changes in the school environment at that time, with the introduction of rotary classes and higher expectations for independent participation. With less involvement or presence of parents to mediate environmental barriers, the perceived influence of environmental barriers increases. A child's PF and behavioral health also significantly influenced perceptions of the impact of environmental barriers. In particular, children with the most limited ability to perform

Table 5: Mean Magnitude of Reported Barriers to Participation by SDQ Cohorts

Environmental Context	SDQ Total (n=426)	Below Threshold (n=310)	At or Above Threshold (n=116)
Services and assistance*	1.03±1.20	0.95±1.21	1.22±1.17
Attitudes*	0.88±1.18	0.69±0.97	1.37±1.50
School and work*	1.55±1.88	1.26±1.68	2.32±2.16
Natural and built environment	1.31±1.35	1.30±1.40	1.34±1.22
Policies*	1.24±1.71	1.10±1.62	1.61±1.90

NOTE. Values are mean ± SD. Threshold based on SDQ scores of 17 or above indicating the presence of significant behavioral difficulties.

\*Significant pairwise comparisons by SDQ cohort ( $P<.01$ ).

daily tasks independently experienced significantly greater perceived barriers in every area except general attitudes.

One quarter of the sample who scored above the clinical threshold for behavioral problems also experienced significantly greater perceived environmental barriers in every area except the physical environment. This finding suggests that children's emotional and behavioral functioning is associated with parents' perceptions of barriers to participation that are more psychosocial than physical or structural in nature. The influence of children's emotional and behavioral difficulties on their participation has seldom been addressed with respect to children with disabilities. Parents may be aware that their children are less confident and more hesitant to take part in activities in the community and school because of past experiences of discrimination or avoidance by others. Parents themselves may be more hesitant in taking their child into the community either because they are concerned about how their child might react to others or that members of the community will view their child's behavior negatively.

### Study Limitations

The strengths of the study include the use of data from a relatively large sample of 427 children with physical disabilities. The use of the CHIEF,<sup>34</sup> a broad-based measure that quantifies the degree to which aspects of a person's physical, social, service, and policy environments act as barriers to full participation, is both a strength and a potential limitation of this study. Although it is currently among the few environmental measures to incorporate the environmental taxonomies described by Bronfenbrenner<sup>19</sup> and the *International Classification of Functioning Disability and Health*,<sup>1</sup> the CHIEF has yet to be validated by using a sample of children with physical disabilities. Nevertheless, we were able to describe significant relationships between the characteristics of children's daily environments and parent-reported barriers to recreational, community, and school participation for children with physical disabilities.

### Implications and Future Directions

Enhancing the participation of school-age children and youth with physical disabilities requires knowledge about perceived environmental barriers and the impact of varied environmental contexts on the child's ability to participate in activities of their choice. Understanding the differential impact of context-specific barriers can help educators, communities, policy-makers, service providers, and families to develop targeted strategies for promoting participation by decreasing barriers and increasing environmental supports.

Although universal design criteria can be developed for the physical and structural environment, the implementation of these criteria and availability of supports is dependent on the policy or institutional environment. Methods to assess the fit between a child, their preferred activities, and specific environmental contexts are required. Donnelly and Harvey (as cited in Beauvais<sup>5</sup>) developed a conceptual model of environmental barriers, identifying them as infrastructure (eg, costs, lack of transportation, lack of specific programs), superstructure (eg, the nature of activities, stigma), or procedural (eg, social support, organizational structure). The assessment of and interventions to address environmental barriers using this type of framework would increase the consistency with which barriers are studied and addressed.

In developing policy initiatives to address environmental barriers to the participation of children and youth with disabilities, examining innovative methods of policy development is

warranted. Traditional policy development begins at the federal, provincial, or state level, and specific policy initiatives are identified for implementation at local levels. In contrast, Dunst<sup>42</sup> and Friedman<sup>43</sup> have recommended the use of backward mapping to address the barriers associated with persons with special needs. Backward mapping involves the use of locally identified knowledge and information to discover or ascertain an individual's needs and perceived barriers.<sup>43</sup> The use of a backward-mapping approach situates policy development closer to the actual problem. Local knowledge is then used to build policies that improve local capacity to address problems such as environmental barriers to participation. Data from this study have the potential to serve as a source of information for backward mapping regarding the environmental barriers that require attention from policy-makers. Fostering participation across a community and not always at the level of each individual child and family is a potentially fruitful method of improving participation. Enhancing participation for children and youth with disabilities could use a 2-fold approach to change by both reducing environmental barriers and building improved environmental supports. Through this process, communities can focus on building an integrated policy toward inclusion and participation of children with disabilities through such practices as provision of timely information through multiple community sources and mapping the assets of the community.

### CONCLUSIONS

Findings from this study indicate the presence of multiple environmental barriers to recreational, community, and school participation, thus opening up opportunities for multiple points of entry to facilitate change. Intervention can use both upstream, population-based change approaches as well as downstream, individualized approaches to address barriers, build strengths, and enhance participation.<sup>44</sup> Although we cannot always change a child's functional abilities, in most circumstances, we can enhance participation by minimizing disabling gaps between a child's capabilities and the social and physical demands of the environments in which children live, learn, play, and develop.

**Acknowledgments:** We extend our appreciation to Jessica Telford, BA, and Dayle McCauley, BSc, for their contributions to this project.

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#### Supplier

- a. Version 14.0; SPSS Inc, 233 S Wacker Dr, 11th Fl, Chicago, IL 60606.