Predictors of the Leisure and Recreation Participation of Children With Physical Disabilities: A Structural Equation Modeling Analysis

Gillian King
Thames Valley Children’s Centre

Mary Law, Steven Hanna, Susanne King, Patricia Hurley, and Peter Rosenbaum
CanChild Centre for Childhood Disability Research

Marilyn Kertoy
University of Western Ontario

Terry Petrenchik
CanChild Centre for Childhood Disability Research

Structural equation modeling was used to test a theoretically based model of environmental, family, and child factors as determinants of the leisure and recreation participation of children with physical disabilities. Participants were 427 families and children (229 boys and 198 girls) with physical functional limitations, in 3 age groups (6–8, 9–11, and 12–14 years). Data were collected via home interviews and self-administered standardized questionnaires. The significant direct predictors of children’s participation intensity in both formal and informal activities were child functional ability, family participation in social and recreational activities, and child preferences for formal and informal activities. Family cohesion, unsupportive environments, and supportive relationships for the child had significant indirect effects on...
Participation refers to involvement and engagement in life situations, including leisure and recreation activities (World Health Organization, 2001). Children’s participation is of fundamental importance. Participation is associated with children’s behavioral and emotional well-being (Rae-Grant, Thomas, Offord, & Boyle, 1989; Sandler, Ayers, Suter, Schultz, & Twohey-Jacobs, 2004), their social relationships and development of social and physical competencies (M. Brown & Gordon, 1987; Larson & Verma, 1999), and their sense of meaning and purpose in life (R. I. Brown, Brown, & Bayer, 1994).

An estimated 3.6% of children with chronic physical health conditions have activity limitations that restrict their participation (McDougall et al., 2004), including participation in formal and informal leisure and recreation activities outside of school. Formal activities are structured activities that involve rules or goals; have a formally designated leader, coach, or instructor; and often require advance planning (King et al., 2004; Sloper, Turner, Knussen, & Cunningham, 1990). Informal activities are more spontaneous in nature and are often initiated by the child. Compared to children without disabilities, children with disabilities tend to engage in fewer recreational and social activities (M. Brown & Gordon, 1987; Sillanpää, 1987), and the diversity of their participation declines more dramatically as they move into adolescence (M. Brown & Gordon, 1987; Stevenson, Pharoah, & Stevenson, 1997).

Many factors have been found to be associated with children’s participation, including physically accessible and welcoming environments; family factors, such as income and family functioning; and child factors, such as cognitive ability and social skills (King et al., 2003). Studies typically examine the influence of a small subset of these factors on the diversity or frequency of children’s participation. It is important, however, to understand the relative importance of the many factors that may influence the leisure and recreation participation of children with physical disabilities and the paths by which these factors have their effects. In this article, we report the development and testing of a model of participation that specifies associations among environmental, family, and child variables and their links to the outcome of participation. We tested the fit of this model using structural equation modeling (SEM) and the first wave of data collected from a 3-year longitudinal study of the participation of children with physical disabilities.

Without knowledge of the most important factors in what is undoubtedly a complex set of relationships, it is difficult to plan interventions to enhance children’s participation or to design effective policies and programs on a broader, systems level (King et al., 2003). Currently, it is unclear whether it is best to intervene on the child, family, or environmental level and which specific factors...
should be addressed. Parents, service providers, managers, and policymakers need to know which factors are the most important determinants of children’s participation, how these factors operate together to enhance or limit participation, and whether the pathways to participation are different for boys and girls and for children of different ages.

THE MODEL OF DETERMINANTS OF THE LEISURE AND RECREATION PARTICIPATION OF CHILDREN WITH PHYSICAL DISABILITIES

SEM needs to be based on an a priori model with a sound theoretical basis (Overton, 1998). We developed a theoretically based model of the factors and processes affecting the participation of children with disabilities in leisure and recreation activities, based on a developmental systems perspective (Lerner, 1998) and a socioecological approach (Bronfenbrenner, 1979). A developmental systems perspective emphasizes a configural viewpoint, which encompasses multiple levels of causality and considers the combined influence of an arrangement or system of variables as well as the mechanisms by which the social–cultural world provides opportunities, contexts, and settings for children’s development (Overton, 1998).

The proposed model, presented in Figure 1, incorporates environmental-, family-, and child-level variables, as contained in Bronfenbrenner’s (1979) social–ecological model. The model presents key factors affecting children’s outcomes, selected on the basis of theory and evidence (discussed later). It consists of 10 constructs grouped into five categories: (a) resources and barriers (family income; absence of time and financial impact on the family; and unsupportive physical, social, and attitudinal environments), (b) supports (supportive relationships for the child and family cohesion), (c) preferences (family preference for recreation and child preference for recreation), (d) child abilities (child functional ability and child emotional function), and (e) children’s participation. The arrows in Figure 1 specify hypothesized relationships among the variables, indicating pathways by which children participate more intensely in leisure and recreation activities, based on a review of the literature (presented later).

The variables in the model are represented in an ecological sequence—from more distal environmental and family variables to proximal child variables. The categories of resources and barriers, supports, preferences, and abilities capture the major types of variables that have been identified as important determinants of children’s development (Bronfenbrenner & Ceci, 1994), resilience (Garmezy, 1985), engagement in leisure activities (Crawford & Godbey, 1987), and participation in physical activities (DiLorenzo, Stucky-Ropp, Vander Wal, & Gotham, 1998).
FIGURE 1  Conceptual model of factors and pathways to children's participation.
The model outlines the mechanisms by which children’s participation is thought to be enhanced. It posits that resources provide opportunities that, along with supportive contexts, influence both child and family preferences, as well as child abilities, which in turn are the more proximal predictors of children’s participation in leisure and recreation activities. Resources, barriers, and supports therefore are considered to be indirect predictors of children’s participation through their effects on more proximal variables—child and family recreational activity preferences and child abilities. This is in keeping with Bronfenbrenner and Ceci’s (1994) bioecological model in which distal variables are considered to have their effects through their influence on more proximal social psychological processes. In the sections that follow, we provide detailed justification for the selection of the variables in the model and provide empirical evidence for each bivariate link specified in the model.

SELECTION OF VARIABLES FOR INCLUSION IN THE THEORETICAL MODEL

Using a developmental systems perspective and a socioecological approach as our basis, we reviewed four bodies of literature to develop an inventory of potentially important variables associated with children’s participation: (a) the rehabilitation literature on the participation of children or adults with disabilities, (b) the psychology literature on the risk and resilience of children facing adversity, (c) the recreation literature on determinants of leisure and recreation activities, and (d) the general literature on factors influencing physical activity and exercise. Together, these bodies of literature point to the importance of four categories of variables as direct or indirect determinants of children’s participation.

The first category consists of resources and barriers, including family income; the financial and time resources of the family; and the presence of unsupportive physical, social, and attitudinal environments. Family income level and cost of activities have been identified as factors affecting the participation of children and youth (Hanvey et al., 1994). Aspects of the physical environment that restrict the participation of children with disabilities include lack of accessible transportation, lack of information about programs, and lack of appropriate opportunities and suitable programs (Garton & Pratt, 1991; Lockwood & Lockwood, 1991). Unsupportive social and attitudinal environments also play an important role in the extent to which children with disabilities engage in community activities (Law, 1993).

The second main category of factors is supports, which includes supportive relationships for the child and family cohesion. The support and effort of families is an important determinant of the participation of children with disabilities (Schleien, Green, & Heyne, 1993). The literature on risk and resilience stresses the role played by the family and environmental systems that surround a child; this literature
indicates the importance of family factors such as family cohesion and harmony (Garmezy, 1985; Rutter, 1990). The literature on participation in physical activities and exercise indicates that familial factors such as supportive modeling determine a child’s engagement in physical activity (DiLorenzo et al., 1998; Trost et al., 1997).

A third main category consists of family and child preferences with respect to involvement in recreational and leisure activities. Sloper et al. (1990) found that parents’ recreational orientation affected the participation of children with Down syndrome in organized activities and informal play. The literature on leisure and recreation identifies the importance of interests or preferences as a determinant of participation in these activities (Crawford & Godbey, 1987; Jackson & Searle, 1985).

A fourth category consists of child abilities, which includes the child’s functional ability (i.e., cognitive, communicative, and physical functioning) and emotional functioning. The literature indicates the importance of the child’s functional abilities (Garmezy, 1985; Sloper et al., 1990). Difficulties in communicating leisure needs and in making decisions about leisure participation (related to children’s communicative and cognitive abilities) appear to be important factors (Lockwood & Lockwood, 1991). Emotional functioning is considered to be important, because feeling self-conscious or socially awkward can make involvement in activities difficult for a child (Lightfoot, Wright, & Sloper, 1999).

**SPECIFICATION OF PATHWAYS IN THE MODEL**

(SPECIFIC HYPOTHESES TESTED)

The model outlines various pathways by which the factors may directly or indirectly influence the extent and scope of children’s participation. We conducted a comprehensive review of known empirical relationships between the variables identified as important in the literature and that fit our theoretical framework. Catalano and Hawkins (1996) used a similar approach to construct their model of social development. The resulting model in Figure 1 (a) organizes a broad range of factors into a coherent model containing clear causal hypotheses, (b) specifies multiple paths to outcomes, and (c) explicitly integrates empirically supported factors into theoretical pathways. Seventeen paths were predicted.

**Family Income**

We hypothesized that higher annual family income would be related to (a) lower financial and time impact of caring for a child with a disability (King, King, Rosenbaum, & Goffin, 1999; McCormick, Charney, & Stemmler, 1986), (b) higher family preference for and encouragement of recreation (because there are financial resources available for this purpose), and (c) higher levels of child functional ability (Cadman et al., 1986; Walker, Greenwood, Hart, & Carta, 1994).
Absence of Financial and Time Impact on Family

We predicted that less financial and time impact of caring for a child with a disability would be related to higher levels of family cohesion (because family functioning is related to day-to-day burden; King et al., 1999) and higher levels of child participation (because financial demands may limit the availability of dollars for recreation, and labor-intensive daily care routines may limit the time parents have to support their child’s participation; Perrin, 1986).

Unsupportive Physical, Social, and Attitudinal Environments

We hypothesized that this factor would be associated with lower levels of family cohesion (because neighborhood cohesion is associated with family functioning; King et al., 2005) and lower levels of child emotional function (Rutter, 1986).

Supportive Relationships for the Child

We hypothesized that higher levels of support for the child would be associated with higher levels of child preference for recreation activities (because the child would have companionship and emotional support; Medrich, Roizen, Rubin, & Buckley, 1982) and higher levels of child emotional function (Wallander & Varni, 1989).

Family Cohesion

*Family cohesion* refers to the degree of commitment, help, and support that family members provide to one another. We predicted that greater family cohesion would be associated with (a) higher family preference for engaging in recreation activities (because families with high levels of cohesion will be interested in doing things together; Orthner, 1985), (b) higher child preference for recreational activities (because cohesive families may encourage children’s interest in recreation), (c) higher levels of child functional ability (because a more supportive family milieu is associated with better child cognitive and physical function; Landry, Smith, Miller-Loncar, & Swank, 1997), and (d) higher levels of child emotional function (Rae-Grant et al., 1989; Wallander, Varni, Babani, Banis, & Wilcox, 1989).

Family Preference for Recreation

We hypothesized that higher levels of family preference for engagement in recreational activities would be associated with higher levels of child participation (Sloper et al., 1990).
Child Preference for Recreation

We hypothesized that this variable would be associated with higher levels of child participation in recreational activities (Garton & Pratt, 1987; Medrich et al., 1982; Tappe, Duda, & Ehrnwald, 1989).

Child Functional Ability

This factor refers to the child’s cognitive, communicative, and physical functioning. We hypothesized that higher levels of child functional ability would be associated with higher levels of child participation (King et al., 2005; Lepage, Noreau, & Bernard, 1998; Sloper et al., 1990).

Child Emotional Function

We hypothesized that this variable would be associated with higher levels of child participation (Rae-Grant et al., 1989; Sandler et al., 2004).

STUDY OBJECTIVES

The objectives were (a) to use SEM to test the fit of a model of predictors of the intensity of the participation of children with physical disabilities in leisure and recreation activities, (b) to examine both direct and indirect effects and pathways to outcomes by decomposing the total effects in the model, and (c) to conduct moderator analyses to examine the effects of children’s sex and age on pathways to participation.

METHOD

Participants

The participants were 427 families and children (229 boys and 198 girls) with physical functional limitations (1 child per family), in three age cohorts (6–8 years 11 months; 9–11 years 11 months; and 12 years or older). This article utilized the first wave of data from a 3-year longitudinal study of the participation of children with physical disabilities, in which the three age cohorts of children were followed forward in time, with data collected at 9-month intervals. Ethical approval for the study was obtained from McMaster University.

Eleven publicly funded regional children’s rehabilitation centers and 1 children’s hospital in the province of Ontario, Canada, assisted with recruitment. The
organizations compiled lists of all children with physical disabilities born between October 1, 1985, and September 30, 1994 (inclusive), and provided us with non-identifiable information about children’s sex, date of birth, primary diagnosis, and secondary diagnostic data, if available. Using guidelines developed by the study team, two investigators reviewed the lists and selected children who fit the criterion of having a “physical functional limitation.” Children with the following primary diagnoses or conditions were included: amputation, cerebral palsy, cerebral vascular accident/stroke (vascular brain disorders), congenital anomalies, hydrocephalus, juvenile arthritis, nonprogressive muscular disorders, neuropathy, orthopedic conditions (e.g., scoliosis), spinal cord injury, spina bifida, and traumatic brain injury.

Families of children who met the inclusion criteria with respect to age and physical functional limitation were invited to participate. Lists of ID numbers of these children were sent to staff members at the participating recruitment sites, who then sent packages from the research team inviting families to take part. Of 469 consenting families, 28 withdrew prior to data collection and 14 were judged to be unsuitable by the interviewer due to severe cognitive or communicative limitations (which affected their ability to communicate their responses and/or raised questions about the reliability of their responses), leaving 427 children and families in the study. We consider the sample to be representative because we sampled centers from both rural and urban areas across the province; the majority of children with physical disabilities have the opportunity to be served by these rehabilitation centers.

Procedure

A package of self-administered questionnaires was mailed to the family, to be completed prior to a home visit. The parent-completed measures included a demographic questionnaire, the Craig Hospital Inventory of Environmental Factors (CHIEF; Whiteneck et al., 2004), the Child Health Questionnaire–50 (CHQ-50; Landgraf, Abetz, & Ware, 1996), the Family Environment Scale (FES; Moos & Moos, 1994), the Impact on Family Scale (IOF; Stein & Riessman, 1980), and the Strengths and Difficulties Questionnaire (Goodman, 1997). The child-completed measures included the Activities Scale for Kids (ASK; Young, Williams, Yoshida, & Wright, 2000) and Phase 1 of the Children’s Assessment of Participation and Enjoyment (CAPE; King et al., 2004). Parents also completed the Communication Domain of the Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 1984) via a phone interview.

Families were contacted by 1 of 15 experienced study interviewers to arrange a home-based interview in which the child completed the following measures: Phase 2 of the CAPE (King et al., 2004), Preferences for Activities of Children (PAC; King et al., 2004), the Peabody Picture Vocabulary Test—Third Edition (PPVT–III; Dunn & Dunn, 1997), and the Social Support Scale for Children (Harter, 1985). As part of the study’s quality control procedures, interviewers
received training workshops, written materials, and feedback on videotapes of their interviews.

Measurement of Constructs

Unsupportive physical, social, and attitudinal environments. This construct was measured using the Policies, Physical/Structural, Work/School, Attitudes/Support, and Services/Assistance subscales of the CHIEF (Whiteneck et al., 2004). The CHIEF is a 25-item scale that quantifies the degree to which aspects of the physical, social, and political environment act as barriers to full participation. The CHIEF has good test–retest and internal consistency reliability and evidence of content, construct, and discriminant validity (Whiteneck et al., 2004).

Family income. This construct was measured using a single indicator of annual family income, measured on a 7-point scale.

Absence of financial and time impact on family. This construct was measured using the IOF Financial Impact scale score (Stein & Riessman, 1980) and the Parental Impact-Time scale from the CHQ-50 (Landgraf et al., 1996). The IOF is a 24-item scale that yields a total score and four subscores measuring the impact of living with a child with a disability on various components of family life. It has adequate internal consistency (Stein & Reissman, 1980). The CHQ-50 examines the child’s functioning from a parent or caregiver perspective, including the impact of the child’s functioning on the parent. The CHQ-50 has adequate construct validity, excellent content validity, and adequate to excellent internal consistency scores.

Supportive relationships for the child. Supportive relationships were measured using the Parent, Close Friend, and Teacher Support scales of the 24-item Social Support Scale for Children (Harter, 1985). The Social Support Scale for Children is a 24-item instrument that measures the degree to which significant individuals in the child’s life positively respond to him or her. The scale has excellent content, criterion, and construct validity; internal consistency scores range from .72 to .88 (Harter, 1985).

Family cohesion. This construct was measured using the nine-item Family Cohesion scale from the FES (Moos & Moos, 1994). Family cohesion measures the degree of commitment, help, and support that family members provide to one another. The FES has been widely used and has adequate test–retest reliability (scores for the 10 subscales range from .52 to .89) and adequate internal consistency reliability (scores ranging from .61 to .78; Moos & Moos, 1994).
Family preference for recreation. This construct was measured using two scales of the FES (Moos & Moos, 1994): the Intellectual–Cultural Orientation scale, which assesses the family’s degree of interest in political, social, intellectual, and cultural activities, and the Active–Recreational Orientation scale, which taps the extent of the family’s participation in social and recreational activities.

Child preference for recreation. The PAC (King et al., 2004) was used to assess preferences for formal and informal leisure and recreation activities. It has demonstrated good internal consistency and construct validity (King et al., in press; King et al., 2004).

Child functional ability. Three indicators were used to measure this construct: cognitive functioning (PPVT–III; Dunn & Dunn, 1997), communicative functioning (VABS; Sparrow et al., 1984), and physical functioning (ASK; Young et al., 2000). The PPVT–III and the VABS are widely used measures with good psychometric properties. The ASK is a 30-item measure that provides a total score. The ASK has excellent reliability (internal consistency, test–retest, intrarater, and intrarater reliabilities of .94 or greater) and good construct and criterion validity (Young et al., 2000).

Child emotional function. This construct was measured using three scales of the CHQ-50 Parent Report Form (Role Emotional and Behavioral, Mental Health, and Self-Esteem; Landgraf et al., 1996) and two scales of the Strengths and Difficulties Questionnaire (Goodman, 1997; the Total Difficulty Score and Prosocial Behavior). Both measures have excellent reliability and good construct validity (Goodman, 1997; Landgraf et al., 1996).

Child participation. The CAPE (King et al., 2004) was used to assess the intensity of children’s participation in leisure and recreation activities outside of mandated school activities. The CAPE is a reliable and valid self-report measure of participation that includes both formal and informal domains (King et al., in press; King et al., 2004). In this study, the CAPE consisted of 49 items (13 formal and 36 informal activities) and was administered in two phases: (a) a self-administered questionnaire booklet (with parent/caregiver assistance, as needed) to determine what activities the child participated in (in the previous 4 months) and how often (on a 7-point scale from 1 [1 time in the past 4 months] to 7 [1 time a day or more]), followed by (b) a home interview gathering information about with whom the child took part in activities, where the activities took place, and the child’s enjoyment of the activities. Formal and informal participation intensity were calculated by dividing the sum of item frequency by the number of possible activities in each domain.
Overall Analytic Strategy

We used SEM to develop and test a model of predictors of participation intensity. Preliminary analyses were conducted to examine and ensure the quality of the data. Missing data were handled using maximum likelihood estimation of the means, variances, and covariances required for SEM analysis (Little & Rubin, 2002). We used SEM to conduct confirmatory factor analyses to ensure that the indicators loaded significantly on the constructs of interest (Jöreskog, 1993). We then established a structural model with adequate goodness of fit. Following the recommendation of Robles (1996), post hoc model modification was kept to a minimum and occurred only when theoretically defensible. We decomposed the indirect effects in the model (after R. L. Brown, 1997) to examine the magnitude of different pathways to the outcome of participation. Moderator analyses were performed to examine the role of children’s sex and age as potential moderators for structural differences.

SEM Approach

We used SEM to estimate the pathways outlined in the initial model (see Figure 1), using Mplus version 3 (Muthen & Muthen, 2004). SEM has two main components: a measurement model that defines latent unobserved constructs in terms of a set of measured indicators and a structural model that specifies a set of causal relationships among the constructs. Maximum likelihood estimation was used to estimate the entire set of parameters in the model simultaneously (Bollen, 1989). Power requirements for SEM models suggest a subjects-to-parameter ratio of 4:1 to 6:1 (Bentler & Chou, 1987; Hoyle, 1991). Our model specified 76 free parameters. Applying a ratio of 5:1 indicates a required sample size of 380; the number of children in the study sample was 427.

We tested the model fit using several standardized fit statistics: the comparative fit index (CFI; Bentler, 1990), the root mean square error of approximation (RMSEA; Steiger, 1990), and the standardized root mean square residual (SRMR; Hu & Bentler, 1999). These indexes gauge how well the estimated population covariance matrix implied by the model reproduces the sample covariance matrix. A good-fitting model is indicated by CFI values at or above .90, RMSEA less than .06, and SRMR less than .08 (Hu & Bentler, 1999; Thompson, 2000).

RESULTS

The findings are presented in four steps: (a) the measurement model, (b) the structural equation model, (c) indirect effects and pathways, and (d) analyses examining the role of sex and age as moderator variables.
The Measurement Model

To determine the reliability of the measurement of constructs, we used factor analysis to examine the loadings of indicators on the constructs. This process led to three refinements to the conceptual model presented in Figure 1. Child preference for recreation was divided into two constructs (Formal and Informal Preferences), as was intensity of participation (Intensity of Formal and Informal Participation). Family preference for recreation was divided into Family Intellectual–Cultural Orientation and Family Participation in Social and Recreational Activities.

Table 1 presents the constructs of interest and their respective indicators and factor loadings, where applicable. The loadings of the measured indicators on the factors were of acceptable magnitude (ranging from .40 to .85). Table 2 presents the correlations among the derived variables. With the exception of Unsupportive Environments, higher scores on all variables are keyed in a positive direction indicating, for example, higher support, higher functioning, or stronger preferences.

The Structural Model

Initially tested models contained all the paths among factors that were compatible with our theoretically based model and refinements to the constructs that occurred at the measurement model stage. Because the model now contained two participation outcomes, two child preference constructs, and two aspects of family activity orientations, paths were added from preceding variables in the model to these more refined variables.

Two constructs (Absence of Financial and Time Impact on Family, and Child Emotional Function) were dropped from the analyses because they did not lead directly or indirectly to participation and reduced the fit of the model. To improve model fit, one path was dropped: Unsupportive Environments to Family Cohesion. The process of model building resulted in six new proposed pathways, all theoretically justifiable: (a) from Family Income to Supportive Relationships for the Child (because higher socioeconomic status is associated with parents’ ability to provide a supportive home environment; Brooks-Gunn, Duncan, & Britto, 1999), (b) from Unsupportive Environments to Child Functional Ability (because environmental barriers limit opportunities for the development of children’s competencies; Sandler et al., 2004), (c) from Child Functional Ability to Family Participation in Social and Recreational Activities, and to Family Intellectual–Cultural Orientation (because families have more interest, comfort, and time to engage in community activities when their child has a higher level of functioning; Perrin, 1986), and (d) from Child Functional Ability to Child Preference for Informal Activities and to Child Preference for Formal Activities (because children’s activity preferences are linked to their abilities; DiLorenzo et al., 1998).

For highly related pairs of variables, we specified correlations of the structured residuals to quantify the degree of correlation and improve model fit. The final
<table>
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<th>Construct</th>
<th>Indicators and Sources</th>
<th>Standardized Loadings</th>
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**Note.** Empty cells indicate that there was no loading because the construct is measured by a single indicator. CHIEF = Craig Hospital Inventory of Environmental Factors; IOF = Impact on Family Scale; CHQ-50 = Child Health Questionnaire-50; SSSC = Social Support Scale for Children; FES = Family Environment Scale; PPVT-III = Peabody Picture Vocabulary Test–Third Edition; VABS = Vineland Adaptive Behavior Scales; ASK = Activities Scale for Kids; SDQ = Strengths and Difficulties Questionnaire; PAC = Preferences for Activities of Children; CAPE = Children’s Assessment of Participation and Enjoyment.
### TABLE 2
Correlations Among Study Variables

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*Note.* Correlations are based on data in which maximum likelihood estimation was used to estimate missing data. 1 = Unsupportive Physical, Social, and Attitudinal Environments; 2 = Family Income; 3 = Absence of Financial and Time Impact on Family; 4 = Supportive Relationships for the Child; 5 = Family Cohesion; 6 = Family Intellectual-Cultural Orientation; 7 = Family Participation in Social and Recreational Activities; 8 = Child Functional Ability; 9 = Child Emotional Function; 10 = Child Preference for Informal Activities; 11 = Child Preference for Formal Activities; 12 = Intensity of Informal Participation; 13 = Intensity of Formal Participation.
structural equation model (presented in Figure 2) showed moderate to good fit indexes (CFI = .90, RMSEA = .06, SRMR = .06). The arrows in the figure indicate statistically significant path coefficients ($p < .05$). Insignificant direct paths are shown with broken lines. Directly measured variables are indicated by squares; latent constructs (consisting of a number of indicators) are indicated by ellipses.

The model shows three significant direct paths to Informal Participation Intensity: from Child Functional Ability (.39), Child Preference for Informal Activities (.31), and Family Participation in Social and Recreational Activities (.18). As well, the model shows four significant direct paths to Formal Participation Intensity: from Child Preference for Formal Activities (.28), Family Participation in Social and Recreational Activities (.18), Family Intellectual–Cultural Orientation (.16), and Child Functional Ability (.13).

Indirect Effects and Pathways

The SEM model contained a number of indirect paths to the participation outcomes. One of the study’s objectives was to examine these pathways to understand the role played by more distal variables in the model. The total effects in the model therefore were decomposed to determine the size of direct and indirect effects (R. L. Brown, 1997). Space precludes the full presentation of these effects (available on request from Gillian King). We determined the strongest specific indirect paths (i.e., statistically significant effects greater than .05 in magnitude). Indirect paths of this magnitude are noteworthy: Because indirect paths depend on a series of causal steps, they are typically smaller than more proximal, direct effects.

Six paths met this criterion. Parents’ perceptions of Unsupportive Environments had significant indirect effects on both outcomes through effects on Child Functional Ability ($\beta = -.187, p < .001$, to Informal Participation Intensity, and $\beta = -.060, p < .05$, to Formal Participation Intensity). Family Cohesion had a significant indirect effect on Formal Participation Intensity through Family Intellectual–Cultural Orientation ($\beta = .049, p < .01$) and on both outcomes through effects on Family Participation in Social and Recreational Activities ($\beta = .058, p < .001$, to Informal Participation Intensity, and $\beta = .055, p < .01$, to Formal Participation Intensity). Supportive Relationships for the Child affected Informal Participation Intensity through Child Preference for Informal Activities ($\beta = .064, p < .05$).

Moderation Effects

We investigated the roles of sex and age as moderators of the paths in the model, using multiple group analyses (Hayduk, 1987). Modification indices were examined to determine whether significant improvements in model fit could be obtained by specifying interactions involving sex or age. Chi-square tests indicated no
FIGURE 2  Model of children’s formal and informal participation intensity.
significant interactions in these models, indicating that these child characteristics did not significantly affect the paths in the model.

DISCUSSION

SEM was used to test a theoretically based model of resources and barriers, supports, preferences, and abilities as predictors of the participation of children with physical functioning limitations, in both formal and informal leisure and recreation activities. The model accounted for 30% of the variance in informal participation intensity and 18% of the variance in formal participation intensity, which suggests that the model is a good-to-fair predictor of the outcomes (Cohen, 1992). The fit of the model was equally good for boys and girls and for children of different ages, indicating that the model is applicable for children with disabilities ages 6 to 14 years.

Major Determinants of Children’s Participation Intensity

As expected, there were multiple interrelated determinants of children’s participation. The major statistically significant predictors of both formal and informal participation intensity were the child’s functional ability, child activity preferences, and family participation in social and recreational activities. These findings parallel those in the literature, which indicate that participation is associated with children’s functional abilities (Lepage et al., 1998; Sloper et al., 1990), their activity preferences (Garton & Pratt, 1987; Tappe et al., 1989), and family preferences to engage in recreation (Sloper et al., 1990). A unique and previously unreported finding was that, even after adjusting for functional ability, children’s preferences and family preferences were important predictors of children’s participation.

The significant direct paths indicate the importance of the mechanisms of opportunity, support, preference, and ability outlined in our theoretical model of participation. Understanding how the direct determinants relate to proximal social psychological processes (Bronfenbrenner & Ceci, 1994) provides a fine-tuned understanding of the ways in which the participation of children with physical disabilities can be enhanced. For example, parental engagement in activities with their children is considered to set into motion a series of occurrences that provide children with a positive sense of self, access to positive models, and trust in others as resources (Garmezy, 1987); this suggests the importance of parental role models and supportive family relationships in the development of children’s competencies.

The major role played by children’s preferences suggests that children’s participation can be encouraged by explicit consideration of children’s motives for engaging in activities. The literature suggests that children are motivated to be involved in activities that supply them with meaningful experiences that satisfy
basic psychological needs, including needs for control, self-esteem, and social relatedness (King, 2004; Sandler et al., 2004; Tinsley & Eldredge, 1995).

Differences in Predictors of Formal and Informal Participation Intensity

One of the advantages of the model of participation we tested is its inclusion of two outcomes, thus allowing direct comparison of the factors and pathways related to formal and informal participation. Three findings are particularly noteworthy. First, family intellectual–cultural orientation significantly predicted formal but not informal participation intensity. Second, children’s functional ability was more strongly associated with their informal than formal participation. Children with lower functional ability may lack the opportunities or supports they require to engage in informal activities, and consequently they may have lower motivation to engage in these activities than in formal activities. Third, children’s preferences for formal and informal activities predicted formal and informal participation intensity, respectively, as expected. Similarly, Medrich, Roizen, Rubin, and Buckley (1982) found the preferences and interests of sixth-grade students to be related to their participation patterns.

Indirect Pathways to Participation

One of the advantages of SEM is the ability to examine indirect effects. By considering significant indirect pathways in the model, we can link variables across levels of analysis (Gore & Eckenrode, 1994) and determine whether the effects of preceding variables on the outcome are fully mediated or accounted for by intervening variables or whether preceding variables have additional noteworthy effects. An understanding of the processes involved provides important theoretical and practical information (Eddy, Dishion, & Stoolmiller, 1998). Interventions may be misguided if they seek to change a preceding factor in a pathway, when an intervening variable functions as a mediator and therefore has the major influence on participation.

Three variables had important (yet relatively small) indirect influences on participation: family cohesion, parental perceptions of environments as relatively unsupportive, and supportive relationships for the child. We consider indirect pathways involving these variables in turn.

First, the largest number of indirect paths was found for family cohesion, indicating the importance of the cohesiveness of the family unit in affecting what family members prefer to do and actually do together. Greater family cohesion was related to stronger family orientation toward intellectual and cultural activities, which in turn was associated with more intense participation by children in activities of a formal nature. Greater family cohesion also was related to higher family participation in social and recreational activities, which in turn was associated with both more intense formal and informal participation.
Second, parental perceptions of environments as unsupportive (i.e., relatively inaccessible, less accommodating, and less facilitative in terms of policies, services, attitudes, and assistance) were related to lower functional ability on the part of the child, which in turn was associated with less intense formal and informal participation.

Third, greater support to the child from teachers, parents, and close friends was associated with stronger child preferences for informal activities, which in turn enhanced children’s informal participation. Because greater support to the child was associated with greater family cohesion, this pathway, like others, indicates the importance of family cohesion in affecting participation.

These significant indirect pathways suggest that some family and child variables (notably children’s functional ability, children’s informal preferences, and the family’s orientations toward recreational and intellectual–cultural activities) may be markers of processes involving more distal variables. The pathways provide clues as to how family cohesion, unsupportive environments, and supportive child relationships affect children’s participation. The direct effects show that the most important predictors of participation are child functional ability, child activity preferences, and family orientations; this look at indirect effects broadens our viewpoint to a consideration of the roles of other family and environmental factors involved in what are presumed to be causal, developmental sequences.

Study Strengths and Limitations

The strengths of this study include the use of data from parents and children (multiple data sources); standardized measures; self- and interviewer-assisted measurement; and a representative, provincewide sample. An important advantage of our approach is our holistic testing of the relative roles of barriers and resources, supports, activity preferences, and child abilities, based on a theoretical model. To our knowledge, no other studies of children’s participation have taken such a contextualized, multivariable approach, nor have they examined the relative sizes of pathways to participation outcomes.

Although SEM has many advantages, it is limited in its ability to explore reciprocal causality. We tested particular directional pathways based on theory and evidence but acknowledge that some of these associations likely are reciprocal, requiring more in-depth examination of the most important pathways found in this study. As well, the use of cross-sectional data limits our ability to make strong causal inferences (Cole & Maxwell, 2003). Longitudinal data and replication are required for us to be more confident about true causality.

Although the significant predictors and paths in the models were largely as expected, they should be interpreted with some caution. Because of the context specificity of SEM models, if any one variable is removed, the paths might change (Thompson, 2000). The confirmation bias of SEM (Robles, 1996) requires that
alternate models be tested before we can draw firm conclusions about the relative importance of the factors and pathways.

Last, although the model accounted for a good percentage of the variance in informal participation intensity (30%), it accounted for only 18% of the variance in formal participation intensity, suggesting there are missing variables and pathways with respect to this outcome.

**IMPLICATIONS FOR FUTURE RESEARCH**

Our structural equation model suggests a number of potentially fruitful avenues for future exploration. In terms of the largest direct and indirect effects, the model directs attention to (a) more detailed investigation of family cohesion and family preferences and (b) particular child variables, namely, preferences, functional ability, and supportive relationships. The model also indicates the utility of research examining how broader social structural factors, such as welcoming community environments and neighborhood cohesion, are involved in producing this constellation of protective family and child factors (Gore & Eckenrode, 1994).

**IMPLICATIONS FOR PRACTICE AND POLICY**

Explaining the participation of children with physical disabilities is complex. The findings, however, point to several family and child factors that should be considered by community agencies when planning community development initiatives and services to promote children’s participation. This study shows us the types of contextual requirements children need (i.e., family and community factors) as well as necessary personal resources, such as motivation (preferences) and functional ability to engage in activities.

**Implications for Service Providers**

Service providers can play an important role in helping children and families to recognize the multiple factors influencing participation. Service providers may find it beneficial to formally assess children’s functional abilities and activity preferences, family engagement in social and recreational activities, and family activity preferences and to discuss these aspects with families, because these are the major factors influencing participation. Service providers might also consider the supports that could be provided to influence a child’s participation in informal activities, because support from parents, close friends, and teachers plays an important role in promoting informal participation.
Implications for Policy

The findings suggest that policy interventions are likely to be most effective when they address both direct and indirect determinants of children’s participation. Children participate more intensely when they have higher levels of functioning, stronger preferences for activity engagement, and when their families participate more in social and recreational activities. In addition, indirect pathways show that children participate more intensely when environmental barriers are lower, when they have more supportive families and school environments (i.e., teacher and classmate support), and when family members help and support one another (family cohesiveness). The findings are not definitive enough to guide clear recommendations with respect to policy, but they do provide useful initial information with respect to the major variables, pathways, and processes affecting children’s participation.

Programs and services need to intervene on the level of relevant processes (Nettles, Mucherah, & Jones, 2000). These findings suggest the importance of the processes of opportunity and support, preference, and perceptions of functional ability in determining the extent of children’s leisure and recreation participation. These processes imply the importance of policies providing opportunities, resources, and supports that promote the development of children’s competencies, meet their needs for satisfying and meaningful participation and inclusion, and protect both children and families from adversities (Sandler et al., 2004). The findings therefore indicate the importance of public policies and multipronged prevention and intervention approaches directed toward providing opportunities and supports at the environmental, family, and child levels (Sandler et al., 2004). Overall, it appears that the most benefit in enhancing children’s leisure and recreation participation will be had by intervening on the level of the family system, which involves developing and implementing policies that provide opportunities and supports that bolster family resources, knowledge, and functioning.

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REFERENCES


