

What do you like to do in Your Free Time? Activity Preferences of Adolescents Born Extremely Preterm

Noémi Dahan-Oliel¹, Barbara Mazer², Désirée Maltais³, Patricia Riley⁴, Line Nadeau³ and Annette Majnemer^{5*}

¹Montreal Children's Hospital-McGill, University Health Centre and Centre for Interdisciplinary Research in Rehabilitation.

²Assistant Professor, School of Physical and Occupational Therapy, McGill University. Research Associate, Centre for Interdisciplinary Research in Rehabilitation-Jewish Rehabilitation Hospital,

³Associate Professor, Department of Rehabilitation, University of Laval, Quebec City, Canada and Centre for Interdisciplinary Research in Rehabilitation and Social Integration, Quebec City, Canada

⁴Director, Neonatal Follow-up Program, Montreal Children's Hospital-McGill, University Health Centre

⁵Director and Associate Dean, School of Physical and Occupational Therapy, Faculty of Medicine, McGill University. Research Associate, Montreal Children's Hospital-McGill University Health Centre and Centre for Interdisciplinary Research in Rehabilitation, Montreal, H3G 1Y5, Canada

*Corresponding address: Annette Majnemer, Director and Associate Dean, School of Physical and Occupational Therapy, Faculty of Medicine, McGill University. Research Associate, Montreal Children's Hospital-McGill University Health Centre and Centre for Interdisciplinary Research in Rehabilitation, Montreal, H3G 1Y5, Canada, Tel: 514-398-4501; Fax: 514-398-5439; E-mail: annette.majnemer@mcgill.ca

Received date: December 20, 2014, Accepted date: February 04, 2015, Published date: February 11, 2015

Copyright: © 2015 Dahan-Oliel N, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Aim: To describe activity preferences of adolescents born extremely preterm and the association between child and environmental factors with activity preferences. **Methods:** Participants included 127 adolescents between 12 and 20 years of age born at ≤ 29 weeks gestation. Mean age was 16.0 years (SD=2.4 years) and the sample included 67 females. Leisure preferences were assessed using the Preferences for Activities of Children questionnaire. Cognitive ability was assessed by a psychologist using the Leiter-R brief IQ and motor competence was evaluated by a physical or occupational therapist using the Movement Assessment Battery for Children-Second Edition. Other potential determinants of activity preferences included gestational age, maternal education, behavior, mastery motivation, self-perception, social supports and environmental barriers which were assessed using standardized tests and questionnaires. **Results:** Adolescents born extremely preterm reported a high level of interest in a variety of leisure activities, especially social pursuits. Girls preferred social ($p=0.004$), skill-based ($p=0.001$) and self-improvement activities ($p<0.001$) than boys, and boys preferred active-physical activities ($p=0.01$) than girls. Activity preferences did not differ according to age and motor competence. Adolescents with lower cognitive ability (IQ<80) had lower preference for social activities than those with higher cognitive ability ($p=0.028$). Sex and mastery motivation explained 23% (skill-based), 28% (social) and 36% (active-physical) of the variance for activity preferences. **Conclusion:** Child and environmental factors influence activity preferences. Providing positive sex-specific activities in which adolescents born extremely preterm can experience mastery motivation and early successes may enhance healthy choices and continued participation in this population. Healthy choices may be supported by providing adolescents with affordable leisure opportunities in which they will overcome fear of failure, and will experience mastery and competence by designing or adapting existing activities to individual skill level. Attracting and retaining adolescents born extremely preterm in active hobbies may be achieved by fostering physical health and skill development within preferred activities, such as social pursuits.

Keywords: Adolescents; Extreme prematurity; Activity; Preferences; Participation

Introduction

Adolescence is a time of growing autonomy, peer interactions and increased opportunities to make choices. Leisure, defined as the positive way adolescents fill their free time, has important developmental and health implications [1]. Leisure activities may be formal, structured activities that have rules and a leader (e.g. lessons, sports) or informal, spontaneous activities initiated by the individual (e.g. listening to music, reading)[2]. Although physical activity in adolescence has indisputable health benefits (e.g. improved cardiovascular health, muscle strength and bone density, lowered obesity, decreased emotional problems and depression, better academic levels and cognitive functioning)[3], declining engagement with increasing age has been documented in youth with disabilities [4]

and in typically developing youth [5]. Reduced participation in other activities, such as social or skill-based, may also have negative implications for physical, social and emotional well-being [6]. Engaging in activities of one's choosing and pursuing one's own interests is considered an important aspect of adolescent development [1] and may be a precursor to continued participation. Understanding which activities adolescents prefer has significant implications for promoting healthy leisure choices, and may be essential for maintaining participation levels during adolescence and beyond.

Behavioral adjustment issues have been reported in children and adolescents born preterm compared to term born peers [7,8]. Learning disabilities [9] and motor impairments [10] have been documented to persist in adolescents born very preterm. These developmental deficits may restrict the participation of these adolescents in the home, at school and in the community. Lower leisure participation scores in social activities, hobbies and sports in adolescents born preterm

compared to term-born controls have been documented [11]. In a study using the Children's Assessment of Participation and Enjoyment, a standardized measure of leisure participation, adolescents born ≤ 29 weeks gestation reported highest participation frequency in social activities (e.g., going to the movies, talking on the phone), followed by recreational activities (e.g., doing crafts, playing computer games), and self-improvement activities (e.g., doing homework, going to the public library). Out of the five activity types, active-physical activities (e.g., team sports, bicycling) and skill-based activities (e.g., playing a musical instrument, dancing classes) received the lowest ranked frequencies. Adolescents reported highest enjoyment scores in skill-based, social and active-physical individual activities indicating that participants particularly enjoy these activities, even though they may not engage in those activities very frequently, and engagement in active-physical activities was less than the recommended national physical activity guidelines, especially in adolescent girls born preterm [12]. Patterns of participation in different activities among adolescents born extremely preterm were similar to youth with disabilities, with less involvement in skill-based activities than recreational and social activities [12].

A range of child (intrinsic) and environmental (extrinsic) factors, including motor competence, social acceptance and maternal education, were associated with participation frequency in different activities in this population, yet preference for particular activities was consistently the factor most highly associated with participation [13]. By understanding the patterns of activity preferences, health-care professionals, educators and family members can identify whether promoting participation in certain activities should be focused on supporting healthy choices, or whether interventions should aim at addressing intrinsic and extrinsic barriers to participation. Preferences for particular activities has been shown to differ among adolescent males and females, [14,15] but has not been explored in adolescents born preterm. Child factors, such as self-perception, motivation and skill level were found to be determinants of leisure preferences in children and youth with cerebral palsy [16,17]. Extrinsic factors including social supports and environmental factors may also shape activity preferences [15]. Currently, there is no evidence on which leisure activities adolescents born preterm prefer most, or which factors are associated with such preferences. By identifying the activity preferences and the factors which influence activity preference, policy makers, clinicians and families may assist adolescents born preterm in leading an active lifestyle through promoting participation in enjoyable and meaningful leisure activities. The objective of this study was to describe the activity preferences of adolescents born at ≤ 29 weeks gestation and to identify the child and environmental determinants of leisure activities.

Materials and Methods

Procedures

This cross-sectional study is part of the "Determinants of Active Involvement in Leisure for Youth- DAILY living with a disability" study on adolescents born extremely preterm or born with a congenital heart defect. The patterns of participation in leisure activities of the adolescent group born extremely preterm [12], as well as the factors associated with leisure participation [13] have been described previously. Adolescents who were born at ≤ 29 weeks gestational age between January 1991 and July 2000 and eligible at birth for the Neonatal Follow-up Program were recruited. Exclusion criteria included documented genetic syndrome or chromosomal anomaly.

Details on recruitment have been described previously [12]. Ethical approval was obtained from the Montreal Children's Hospital Research Ethics Board. Informed consent was obtained from the primary caregiver as well as assent from able adolescents. Standardized assessments, and self-report and parent-report questionnaires were completed during a three-hour visit at the hospital or at the participant's home, to gather information on activity preferences and potential child and family determinants.

Activity preferences

The Preferences for Activities of Children (PAC) [18] is part of a comprehensive evaluation of leisure participation and includes the Children's Assessment of Participation and Enjoyment (CAPE). This measure was developed for children with and without disabilities between six and 21 years of age. The PAC measures the degree of preference for 55 leisure activities, without regards to actual performance. Preference for each activity is rated as 1 (would not like to do at all), 2 (would sort of like to do) or 3 (would really like to do). A continuous score is derived for activities grouped by domain (formal and informal) and by type (recreational, active-physical, social, skill-based and self-improvement). Cronbach alpha for PAC domains ranged from 76-84 and from 67-77 for the five activity types providing evidence for internal consistency. Content validity of the CAPE/PAC has been established [18].

Child factors

Age, sex and gestational age were obtained from hospital records. Motor competence in manual dexterity, aiming and catching, and balance was evaluated by an occupational or physical therapist using the Movement Assessment Battery for Children-Second Edition (MABC-2) [19]. Cognitive ability was assessed by a psychologist using the Leiter-R brief IQ [20]. The Strengths and Difficulties Questionnaire (SDQ) (Goodman, 2001) parent-report was used to evaluate behavior difficulties. The Dimensions of Mastery Questionnaire (DMQ) [21] child-report was used to assess mastery motivation in gross motor tasks, social activities with adults and with children, mastery pleasure, negative reactions to failure, and general competence. Self-perception was measured using Harter's Self-Perception Profile (SPP) using a self-report format [22].

Environmental factors

Maternal education was obtained through a parent questionnaire. Social support was self-reported using the Social Support Scale (SSS) for Children and Adolescents [23]. Environmental barriers were evaluated by parent-report using the Child and Adolescent Scale of Environment (CASE) [24].

Data analysis

Descriptive statistics were used to define adolescents' main characteristics and preferences per activity type and activity domain. Paired t-tests were used to compare preference between formal and informal activities. Independent t-tests were used to identify potential differences in activity preference according to sex, age groups (12-15 and 16-20 years), motor competence, and cognitive ability. Participants with a MABC-2 total score <17th percentile were categorized as having a motor problem, and those scoring <80 on the Leiter-R brief IQ as having low cognitive ability. Significance levels were set at $p \leq 0.05$. The three most and least preferred activities were

determined according to the percentages of participants who chose those activities. To determine associations between child and environmental factors with preference in the five activity types (PAC scores for recreational, active-physical, social, skill-based and self-improvement activities), Pearson correlations (continuous variables) and Spearman correlations (dichotomous variables) were used.

Age, sex, gestational age and maternal education were included a priori, as these variables are known to potentially influence child development. Additional selected independent variables were entered into the final five separate multivariable linear regression models. Assumptions for normality, linearity and homogeneity of variance were examined. Multicollinearity was verified by Variance Inflation Factor and tolerance. Missing data were treated with listwise deletion. Final models were validated using bootstrapping, with repeated samples of the same size as the original, with replacement. Two

thousand replications were produced to estimate bootstrap confidence intervals. Statistical significance was set at $p \leq 0.05$. SPSS 18.0 statistical software was used.

Results

Preference overview including sex and age differences

One hundred and twenty-eight adolescents between 12 and 20 years of age born extremely preterm were originally recruited in the DAILY study. Data is presented on 127, as one participant could not participate by self-report in the PAC assessment due to poor cognitive skills. Mean age of the 127 participants was 16.0 years ± 2.4 years (67 females) and mean birth weight was 901 grams (SD= 220 grams, range: 490-1445 grams). Participants' characteristics are illustrated in Table 1.

	Mean	(SD)	[range]
Age (years)	16.0	(2.4)	[12.0-20.0]
Gestational age (weeks)	26.6	(1.8)	[22.7-29.6]
Birth weight (grams)	901.2	(220.3)	[490-1445]
Cognitive ability (Leiter-R brief IQ composite score)*	91.9	(18.7)	[36-131]
Motor competence (MABC-2 scaled scores)**			
Manual dexterity	6.8	(3.2)	[1-18]
Aiming and catching	7.8	(3.5)	[1-15]
Balance	9.3	(3.7)	[1-15]
Total score	7.3	(3.2)	[1-16]
	N	(%)	
Sex			
Female	67	(52.8)	
Male	60	(47.2)	
School			
Regular	80	(63.0)	
Regular with tutoring/special resources	35	(27.6)	
Special school	7	(5.5)	
Not in school at present time	2	(1.6)	
Missing data	3	(2.4)	
Mother's education			
Incomplete high school or high school diploma	48	(37.8)	
College, university or graduate diploma	73	(57.5)	
Missing	6	(4.7)	

Table 1: Participants' characteristics

PAC Activity types	PAC Mean (SD)			p	PAC Mean (SD)		p
	All (n=127)	Sex			Age		
		Girls (n=67)	Boys (n=60)		12-15 (n=65)	16-19 (n=62)	
Recreational	2.1 (0.3)	2.1 (0.3)	2.0 (0.3)	0.39	2.1 (0.3)	2.0 (0.3)	0.23
Active-physical	2.1 (0.5)	2.0 (0.5)	2.2 (0.4)	0.013	2.0 (0.4)	2.1 (0.5)	0.26
Social	2.6 (0.3)	2.7 (0.3)	2.5 (0.4)	0.004	2.5 (0.4)	2.6 (0.3)	0.11
Skill-based	2.0 (0.5)	2.1 (0.4)	1.8 (0.5)	0.001	1.9 (0.5)	2.1 (0.5)	0.15
Self-improvement	1.9 (0.4)	2.0 (0.4)	1.8 (0.4)	<0.001	1.9 (0.4)	1.9 (0.4)	0.46
PAC Activity domains							
Informal	2.2 (0.3)	2.2 (0.3)	2.2 (0.3)	0.09	2.2 (0.3)	2.2 (0.3)	0.32
Formal	1.9 (0.4)	2.0 (0.4)	1.8 (0.4)	0.10	1.9 (0.5)	2.0 (0.4)	0.38

MABC-2: Movement Assessment Battery for Children-Second Edition
 *possible range of scores 30-170, average scores range between 90-109
 **possible range of scores 1-19, with higher scores denoting better motor competence

Table 2: Preferences for Activities of Children (PAC) differences according to sex and age

The activity type with the highest preference score was social activities (mean=2.6, SD=0.3). The least preferred activity type was self-improvement (mean=1.9, SD=0.4). Informal activities were preferred compared to formal activities ($p \leq 0.001$). Boys preferred active-physical activities when compared to girls (mean difference=0.2, $p=0.01$). Girls preferred social (mean difference=0.2, $p \leq 0.01$), skill-based (mean difference=0.3, $p \leq 0.001$) and self-improvement (mean difference=0.3, $p \leq 0.001$) types of activities when compared to boys. Preferences for activities did not differ according to age groups. Activity preference did not differ according to motor competence. Participants with lower cognitive ability ($IQ < 80$) had lower preference for social activities than those with higher cognitive ability ($p=0.028$). Mean PAC scores per activity type and per domain for all participants and according to sex and age are presented in Table 2.

The most preferred activity (score of 3) was listening to music and the least preferred was doing pretend or imaginary play (Table 3).

Most preferred activity (score of 3)	Activity type	N (%)
Listening to music	Social	108 (85.0%)
Going to the movies	Social	106 (83.5%)
Going on a full-day outing	Social	98 (77.2%)
Least preferred activity (score of 1)		
Doing pretend or imaginary play	Recreational	94 (74.0%)
Doing a religious activity	Self-improvement	83 (65.4%)
Gardening	Active-physical	77 (60.6%)

Table 3: Most and least preferred activities among adolescents born extremely preterm (n=127)

Factors associated with preferences for activities

The relationships between child and environmental factors with preference scores were first explored using univariate analyses. Preference for recreational activities (e.g. playing computer or video games, playing with pets) was modestly correlated with having worse balance, being prosocial, having greater mastery motivation, less overall distress and social impairment, and better self-perception ($r=0.19$ to 0.28 , $p < 0.05$). Preference for active-physical activities, such as doing team sports, and snow or water sports, was positively and modestly associated with less personal distress and social impairment, classmate support, higher maternal education, being better at aiming and catching, being male, feeling socially accepted, having fewer emotional symptoms and better perceived physical appearance ($r=0.18$ to 0.25 , $p \leq 0.05$). Preference for active-physical activities had moderate correlations with better perceived athletic competence ($r=0.35$, $p < 0.001$), and large correlations with greater gross motor persistence ($r=0.49$, $p < 0.001$). Preference for social activities (e.g. hanging out with friends or going to the movies) was positively, but modestly associated with being female, having fewer conduct problems, better manual dexterity, fewer environmental barriers, and less behavioural difficulties, increasing age, friend support, being prosocial and less hyperactive, and with classmate support ($r=0.22$ to 0.29 , $p < 0.05$). Social acceptance ($r=0.31$, $p < 0.001$) and total mastery motivation ($r=0.43$, $p < 0.001$) had moderate correlations with preference of social activities. Preferences for skill-based activities (e.g. taking art lessons, horseback riding, swimming lessons) and self-improvement activities (e.g. reading, doing volunteer work, chores or homework) were positively associated to a modest to moderate degree with being older, female, and having less behavioral difficulties, fewer environmental barriers, and greater mastery motivation ($r=0.20$ to 0.35 , $p < 0.05$). In addition, preference for skill-based activities was modestly correlated with social acceptance, classmate support, friend support and having less overall distress and social impairment ($r=0.20$ to 0.25 , $p < 0.05$).

Cognitive ability was not correlated with preference in any activity type.

Child and environmental factors contributed between 23% (skill-based) to 36% (active-physical) of the variance for activity preferences (Table 4). Worse balance, less personal distress and social impairment, and mastery motivation were significant in the multivariate regression

model for preferences of recreational activities. Once adjusting for all the factors, only sex and components of mastery motivation remained significant for preferences of active-physical, social and skill-based activities. Sex was the only significant factor in the multivariate regression model for preferences of self-improvement activities.

Outcome measure and independent variables	Parameter estimate		Bootstrap	
	Beta	95% CI	Estimate	BCa 95% CI
Recreational				
Motor competence – balance (MABC-2)	-0.02	- 0.04 to 0	-0.02	-0.04 to 0
Behavior – impact scale (SDQ)	-0.02	-0.04 to -0.01	-0.02	-0.04 to -0.10
Total mastery motivation (DMQ)	0.14	0.04 to 0.24	0.14	0.05 to 0.24
r^2 % variance=24.9, $p<0.001$				
Active-physical				
Sex (ref female)	0.19	0.04 to 0.34	0.18	0.04 to 0.36
Gross motor persistence (DMQ)	0.23	0.12 to 0.34	0.23	0.10 to 0.34
r^2 % variance=35.7, $p<0.001$				
Social				
Sex (ref female)	-0.14	-0.26 to -0.02	-0.14	-0.25 to -0.02
Total persistence (DMQ)	0.17	0.08 to 0.27	0.17	0.08 to 0.28
r^2 % variance =27.6, $p<0.001$				
Skill-based				
Sex (ref female)	-0.22	-0.40 to -0.04	-0.22	-0.39 to -0.02
Total mastery motivation (DMQ)	0.16	0.008 to 0.32	0.17	0 to 0.33
r^2 % variance=22.7, $p=0.001$				
Self-improvement				
Sex (ref female)	-0.23	-0.36 to -0.10	-0.23	-0.36 to -0.10
r^2 % variance=25.9, $p<0.001$				

Table 4: Regression models for Preferences for Activities of Children (PAC).

BCa: bootstrap bias-corrected and accelerated; CI: confidence intervals; DMQ: Dimensions of Mastery Questionnaire; MABC-2: Movement Assessment Battery for Children-Second Edition; SDQ: Strengths and Difficulties Questionnaire.

Discussion

This study described the preferences for activities among adolescents born extremely preterm. Participants preferred informal activities, which involve little or no planning and are usually initiated by the youth (e.g. talking on the phone, watching TV) as compared to formal activities, which are structured activities involving rules and an instructor (e.g. swimming lessons, art lessons). Social activities were the most preferred activity type, and self-improvement was the least preferred by adolescents born extremely preterm. Gestational age was

not associated with leisure preferences for any activity type among adolescents born extremely preterm. Similar preference patterns for activity domain [25] and activity type [16,17,25] were found among children and youth with and without physical disabilities, indicating that having a disability or being at risk for one does not play a role in defining leisure preferences.

On the other hand, the significant inverse association between balance and preference for recreational activities in this population is of concern. Recreational activities tend to be passive, sedentary activities typically performed alone and at home, and of limited health benefits compared to active-physical, social and skill-based activities. Earlier gestational age may be linked to cardiovascular disease and diabetes in adulthood; [26] however physical activity may attenuate the effects of low birth weight on chronic disease later in life [27]. Studies

on large samples of typically developing adolescents have reported that boys prefer sports and team-based activities and girls prefer social activities and individual pursuits [14,15]. Lower preferences for active-physical pursuits among adolescent girls born preterm, and lower preference for skill-based activities among adolescent boys born preterm are worrisome, especially as their actual involvement levels in active-physical and skill-based activities are lower than in other activity types, and below the recommended national guidelines for physical activity [12]. In addition to sex, mastery motivation was significantly associated with preference of active-physical, social and skill-based activities in adolescents born preterm. Persistence in gross motor tasks, a subset of mastery motivation, was significantly associated with preferences in active-physical activities, which may imply that the physical activities that adolescents master are probably those they prefer. This reinforces the premise that to promote participation, activities must be adapted to individual skill level. Two Canadian studies on preferences for activities in children and youth with cerebral palsy found that aspects of adolescents' motivation, including gross motor persistence and negative reaction to failure, were determinants of preferences for active-physical, skill-based and self-improvement activities [16,17]. Age only had very modest (and positive) correlations with preference for social ($r=0.24$), skill-based ($r=0.25$) and self-improvement ($r=0.23$) activities indicating that age is not a determining factor of leisure preferences in youth born extremely preterm. Similarly, age was not significant factor in the multivariate regression models of preferences in youth with cerebral palsy [17]. However, efforts to promote healthy leisure choices and participation in those activities need to be strengthened, as involvement in physical activities [14] and in structured hobbies [28] has been found to decline from early to late adolescence.

Similar to the literature on activity preferences of typically developing adolescents [25], social pursuits were identified as the preferred activity type of adolescents born extremely preterm. Therefore attracting and retaining adolescents born preterm in active types of hobbies may be achieved by fostering physical health and skill development within a social context. The ideal activity would therefore be done in the adolescent's social context, with peers, and involve moderate to high vigorous physical activity, with consideration to individual skill level, in order to foster mastery motivation and success. Peer support and positive parent interactions may mediate the redirection from structured to unstructured activities and act as a buffer against negative outcomes in adolescence [29]. Our findings showed only small to moderate correlations between classmate/peer support and social acceptance with preferences for active-physical, social and skill-based activities in adolescents born preterm. Yet, the importance of considering peer interests in leisure choices should not be undermined and helping families and the adolescents themselves to understand the value of leisure should be targeted [30,31] to increase participation of adolescents born preterm. Recognising that preferences for activities are sex-dependent [14, 15], studies are increasingly tailoring physical activity interventions to either girls or boys. Researchers have used popular activities, such as dance in girls [32] and strength training in boys [33] to increase participation levels and are worth considering in adolescents born extremely preterm. Future studies should also identify the role of specific factors (e.g. body image, social acceptance, athletic competence, peer supports) in influencing leisure choices among adolescent boys and girls born preterm, and use those findings to tailor sex-specific health promotion initiatives in this population.

The importance of considering young people's leisure preferences and personal choices for promoting leisure engagement has been documented [1]. Another important factor in determining activity preferences and choices is prior participation in leisure activities, which is illustrated in the work by Eccles and Wigfield [34]. Previous achievement in an activity is likely to be positively interpreted by the child, resulting in high interest-enjoyment value and a consequent desire to repeat this experience. This study did not consider previous participation levels. Another important factor to consider may be the family's socio-economic status in determining the leisure opportunities for the adolescents. Maternal education was used as a proxy for socio-economic status in this study, and although it was not associated with activity preferences, lower maternal education was significantly associated with levels of participation in active-physical and skill-based activities [13].

In conclusion, by identifying the facilitators and barriers to activity preferences, families, educators, health care professionals, community organizers and policy makers may tailor activities to adolescents' choices and preferences to promote participation and sustained engagement. Providing positive sex-specific activities in which adolescents born extremely preterm can experience mastery motivation and early successes may enhance healthy choices and continued participation in this population. Healthy choices may be supported by providing adolescents with affordable leisure opportunities in which they will overcome fear of failure, and will experience mastery and competence by designing or adapting existing activities to individual skill level.

Acknowledgements

We are grateful to the adolescents and their families for their participation in this study. Many thanks to Dr. May Khairy for her recruitment advice, Patricia Grier, RN for making all the recruitment calls, Joey Waknin, Marie-Linda Boghdady and Christopher Saunders for their invaluable help in coordinating this project and Dr. Xun Zang for statistical assistance. Thanks to our testers Dr. Keiko Shikako-Thomas, Shira Vasilevsky, Melissa Turner, Rena Birnbaum, Marie-Elaine Lafrance, Corinne Mercier, Rochelle Rein, Nathalie Bilodeau, Dr. Marie Brossard Racine, Anna Radzioch and Dr. Catherine Zygmontowicz. This study received funding by the Canadian Institutes of Health Research grant, #MOP-102720. Noémi Dahan-Oliel received doctoral support from the Montreal Children's Hospital Research Institute – Foundation of Stars (2009-2010) and from le Fonds de recherche du Québec – Santé (2010-2013).

References

1. Caldwell LL, Witt PA (2011) Leisure, recreation, and play from a developmental context. *New Dir Youth Dev* 2011: 13-27.
2. Law M, King G, King S, Kertoy M, Hurley P, et al. (2006) Patterns of participation in recreational and leisure activities among children with complex physical disabilities. *Dev Med Child Neurol* 48: 337-342.
3. Fedewa AL, Ahn S (2011) The effects of physical activity and physical fitness on children's achievement and cognitive outcomes: a meta-analysis. *Res Q Exerc Sport* 82: 521-535.
4. Longmuir P, Bar-Or O (1994) Physical activity of children and adolescents with a disability: methodology and effects of age and gender. *Pediatr Exerc Sci*. 6:168- 177.
5. Dumith SC, Gigante DP, Domingues MR, Kohl HW 3rd (2011) Physical activity change during adolescence: a systematic review and a pooled analysis. *Int J Epidemiol* 40: 685-698.

6. Dahan-Oliel N, Shikako-Thomas K, Majnemer A (2012) Quality of life and leisure participation in children with neurodevelopmental disabilities: a thematic analysis of the literature. *Qual Life Res* 21: 427-439.
7. Gardner F, Johnson A, Yudkin P, Bowler U, Hockley C, et al. (2004) Behavioral and emotional adjustment of teenagers in mainstream school who were born before 29 weeks' gestation. *Pediatrics* 114: 676-682.
8. Nadeau L, Tessier R, Lefebvre F, Robaey P (2004) Victimization: a newly recognized outcome of prematurity. *Dev Med Child Neurol* 46: 508-513.
9. Litt JS, Gerry Taylor H, Margevicius S, Schluchter M, Andreas L, et al. (2012) Academic achievement of adolescents born with extremely low birth weight. *Acta Paediatr* 101: 1240-1245.
10. de Kieviet JF, Piek JP, Aarnoudse-Moens CS, Oosterlaan J (2009) Motor development in very preterm and very low-birth-weight children from birth to adolescence: a meta-analysis. *JAMA* 302: 2235-2242.
11. Dahan-Oliel N, Mazer B, Majnemer A (2012) Preterm birth and leisure participation: a synthesis of the literature. *Res Dev Disabil* 33: 1211-1220.
12. Dahan-Oliel N, Mazer B, Riley P, Maltais DB, Nadeau L, et al. (2014) Participation and enjoyment of leisure activities in adolescents born at 29 week gestation. *Early Hum Dev* 90: 307-314.
13. Dahan-Oliel N, Mazer B, Maltais DB, Riley P, Nadeau L, et al. (2014) Child and environmental factors associated with leisure participation in adolescents born extremely preterm. *Early Hum Dev* 90: 665-672.
14. Aaron D, Storti K, Robertson R, Kriska A, LaPorte R (2002) Longitudinal study of the number and choice of leisure time physical activities from mid to late adolescence: implications for school curricula and community recreation programs. *Arch Pediatr Adolesc Med* 156:1075-1080.
15. de Bruyn EH, Cillessen AHN (2008) Leisure activity preferences and perceived popularity in early adolescence. *Journal of Leisure Research* 40:442-457.
16. Majnemer A, Shikako-Thomas K, Chokron N, Law M, Shevell M, et al. (2010) Leisure activity preferences for 6- to 12-year-old children with cerebral palsy. *Dev Med Child Neurol* 52: 167-173.
17. Shikako-Thomas K, Shevell M, Lach L, Law M, Schmitz N, et al. (2013) Are you doing what you want to do? Leisure preferences of adolescents with cerebral palsy. *Dev Neurorehabil* Epub ahead of print.
18. King GA, Law M, King S, Hurley P, Hanna S, et al. (2007) Measuring children's participation in recreation and leisure activities: construct validation of the CAPE and PAC. *Child Care Health Dev* 33: 28-39.
19. Henderson SE, Sugden D, Barnett A (2007) *The Movement Assessment Battery for Children*. (Second Edition) (Movement ABC-2). Pearson Clinical. London: Harcourt.
20. Roid G, Miller L (1997) *Leiter International Performance Scale-Revised*. Wood dale, IL: Stoelting.
21. Morgan GA, Busch-Rossnagel NA, Barret KC, Wang J (2010) *The Dimensions of Mastery Questionnaire (DMQ): A manual about its development, psychometrics, and use*. Fort Collins: Colorado State University.
22. Harter S (1988) *Manual for the Self-Perception Profile for Adolescents*. Denver, CO: University of Denver.
23. Harter S (1985) *Manual for the Social Support Scale for Children and Adolescents*. Denver, CO: University of Denver.
24. Bedell GM (2004) Developing a follow-up survey focused on participation of children and youth with acquired brain injuries after discharge from inpatient rehabilitation. *NeuroRehabilitation* 19: 191-205.
25. Bult MK, Verschuren O, Lindeman E, Jongmans MJ, Ketelaar M (2014) Do children participate in the activities they prefer? A comparison of children and youth with and without physical disabilities. *Clin Rehabil* 28: 388-396.
26. Whincup PH, Kaye SJ, Owen CG, Huxley R, Cook DG, et al. (2008) Birth weight and risk of type 2 diabetes: a systematic review. *JAMA* 300: 2886-2897.
27. Laaksonen DE, Lakka HM, Lynch J, Lakka TA, Niskanen L, et al. (2003) Cardiorespiratory fitness and vigorous leisure-time physical activity modify the association of small size at birth with the metabolic syndrome. *Diabetes Care* 26: 2156-2164.
28. Mahoney JL, Larson RW, Eccles JS, Lord H (2005) Organized activities as contexts of development: Extracurricular activities, after-school and community programs. *Earlbaum*. Mahwah NJ. 3-22.
29. Persson A, Kerr M, Stattin H (2007) Staying in or moving away from structured activities: Explanations involving parents and peers. *Dev Psychol* 43: 197-207.
30. Buswell L, Zabriskie R B, Lundberg N, Hawkins A J (2012) The importance of daily family leisure. *Leisure Sciences* 34: 172-190.
31. Lemstra M, Rogers M, Thompson A, Moraros J (2012) Physical activity in youth: prevalence, risk indicators, and solutions. *Can Fam Physician* 58: e54-61.
32. Jago R, Edwards M, Sebire S, Cooper A, Powell J, et al. (2013) Bristol girls dance project (BGDP): protocol for a cluster randomised controlled trial of an after-school dance programme to increase physical activity among 11-12 year old girls. *BMC Public Health* 13:1003.
33. Meinhardt U, Witassek F, Petrò R, Fritz C, Eiholzer U (2013) Strength training and physical activity in boys: a randomized trial. *Pediatrics* 132: 1105-1111.
34. Eccles JS, Wigfield A (2002) Motivational beliefs, values, and goals. *Annu Rev Psychol* 53: 109-132.