

Instructor Behavior and Youth Physical Activity in Recreation Center Programs: The Role of Management on Improving Outcomes

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EXECUTIVE SUMMARY: Managers of recreation center youth physical activity (PA) programs are concerned with customer satisfaction. Satisfaction is determined by a sense of quality, which comes in many forms. In youth PA programs, two forms are outcomes quality (e.g., are children physically active during the program?) and interaction quality (e.g., how do instructors interact with participants?). To understand if instructors are creating an environment for maximum PA participation, objective measurement needs to take place; however, few recreation centers allocate resources to this endeavor. Direct observation is one of the most accurate and comprehensive ways to measure PA as it is able to capture PA, environmental and social data nonintrusively. This study used the System for Observing Fitness Instruction Time (SOFIT) to evaluate participant and instructor behaviors in recreation center PA programs. SOFIT measures lesson context (management, knowledge or motor content), instructor interactions (promoting fitness, demonstrating, instructing, managing, observing or other task), and participant PA levels (lying, sitting, standing, walking or vigorous). Of interest in this study were the relationships between moderate-to-vigorous PA (MVPA) and lesson context, and MVPA and instructor interactions for children ages 3 to 14. The data analysis was conducted by age groups (i.e., 3-6 years, 6-9 years and 9-14 years). The median proportion of time spent in MVPA increased with age (overall 38%). Knowledge development and skill practice were the most often observed components, especially in the youngest age group. The oldest age group spent much more time in game play than the other groups. Instructors spent the majority of their time in general instruction and demonstration. The youngest participants received the most praise while the instructors observed the oldest participants more than the other age groups. For the middle age group, time spent in general content (transition, management, and break) and game play showed increasing effects on MVPA while the skill development showed a decreasing effect. In the oldest age group, knowledge content was a predictor of decreasing MVPA while general content was a predictor of increasing MVPA. For the oldest age group, the instructor demonstrating was a positive predictor of MVPA while the instructor observing was a negative predictor. Different lesson contexts and instructor behaviors have varying effects on MVPA in children depending on their age. Providing

evidence-based objective data can inform management of the quality of programs and allow managers to provide support to the frontline staff in the creation of a better repertoire of strategies for increasing PA with children of all ages.

KEYWORDS: *SOFIT; recreation center; management; physical activity; children; MVPA; direct observation*

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For recreation center youth physical activity (PA) programs to be considered successful, customer satisfaction (of both parent and child) as well as behavior change (increased time in PA) need to occur (Ko & Pastore, 2005; Witt, Crompton, & Baker, 1995). Recreation centers can achieve success by promoting quality in all operational aspects: program quality (range, operating time and information); interaction quality (client-employee and inter-client); outcome quality (physical change, valence and sociability); and physical environment quality (ambience, design and equipment; Ko & Pastore, 2004). Well-organized and well-run recreation centers are identified as the most important factors for customer satisfaction (Lentell, 2000). In youth PA programs, this means, in part, that instructors and participants are “on task” during program time. One way to determine if this is taking place is to measure the PA displayed by participants and to monitor the activities of the instructor over the course of the program. Objectively obtaining evidence-based data on the quality of PA programs allows organizational change to be effective and to benefit those who matter most: the participants. Furthermore, measurement allows managers to direct their efforts to those areas where customers’ needs and requirements are not being met (Lentell, 2000).

Literature Review

Recreation Centers and Physical Activity

Recreation facilities have a great capacity to meet the PA needs of children and youth. The after-school period is the largest block of discretionary time that school-aged children have, and one in which many children participate in community-based PA. Less than half of children’s daily PA comes from participating in school physical education (PE; Brusseau et al., 2011; Tudor-Locke, Lee, Morgan, Beighle, & Pangrazi, 2006), yet the majority of empirical evidence on child and youth PA habits comes from school-based PE interventions (Pate et al., 2000; Sheehan & Katz, 2013). More recently, a growing body of evidence from after-school programs (ASP) that focus on PA, enrichment, academics and nutrition has shed new light on youth PA habits (for example: Beets, Rooney, Tilley, Beighle, & Webster, 2010; Gortmaker et al., 2012; Huberty, Beets, Beighle, & McKenzie, 2013); however, these situations, too, are not the same as leisure time PA. Despite the need to understand the effectiveness of recreation center PA programs, recreation centers allocate few resources to this endeavor and very little evidence exists on the activity levels and the instructor interaction patterns in this milieu (Pate et al., 2003; Pate et al., 2000).

Low enrolment and lack of desire to participate in PA may stem from poorly designed and misunderstood PA and healthy lifestyles programs (Beets, Wallner, & Beighle, 2010;

Dowda et al., 2009; Matson-Koffman, Brownstein, Neiner, & Greaney, 2005; Poest, Williams, Witt, & Atwood, 1989; Trost, Ward, & Senso, 2010). Enjoyment is the foremost goal of participation; however, incongruence between the goals of the instructors and those of the participants may lead to less enjoyment (Cothran & Ennis, 1998). By measuring the amount of time instructors and participants spend on appropriate tasks such as instructing, encouraging and participating, an understanding of the programs can be created and proper benchmarking can take place. A managerial shift in thinking from intuitive-based (centered on theories and principles; Felder & Silverman, 1988) to evidence-based (centered on research) programming can help to create the quality programs that will demonstrate health benefits in children and the continued support of recreation center PA options.

To increase accountability of the recreation center to its patrons, policies and standards need to be in place. Such guidelines reflect the values of the organization, inform the behaviors put forth by the staff (Huberty, Beets, Beigle, & Balluff, 2010) and represent a first step toward promoting healthy behaviors (Bull, Bellew, Schöppe, & Bauman, 2004; Sallis, Bauman, & Pratt, 1998). Second to that is informing the frontline staff (i.e., the instructors) of said policies and standards and providing them with the training and tools to succeed (Sallis et al., 1997; Weaver, Beets, Webster, Beigle, & Huberty, 2012). Finally, putting the policies into practice and monitoring outcomes will determine the effectiveness of the program and identify areas for improvement. Creating policies to promote PA has resulted in children who are more active (Gortmaker et al., 2012; Sharpe, Forrester, & Mandigo, 2011). What's more is that providing instructors with feedback to create positive, fun environments could encourage children and youth to participate more fully in PA and carry that motivation forward into adulthood (Sallis & McKenzie, 1991).

In both Canada and the United States, the recommendation for youth is to achieve at least 60 minutes of moderate-to-vigorous PA (MVPA) daily (Canadian Society for Exercise Physiology, 2012; US Department of Health and Human Services, 2008). More specifically, achieving 50% of PA class time spent in MVPA has become the gold standard (US Department of Health and Human Services, 2000). School-based PE and ASP studies have reported mixed results on achieving these goals. What is yet an unknown is how recreation centers score against these benchmarks.

The context in which PA takes place is an important factor to consider as PA does not occur in isolation from its surroundings (McKenzie & van der Mars, 2015). Direct (or systematic) observation (DO) is a comprehensive method of assessing PA level, duration, and frequency, as well as social and environmental context simultaneously. While methods that are more precise at capturing PA alone exist, such as accelerometry (Trost, 2007), DO offers the least intrusive option and functions better in certain environments, such as in strength training and in water sports (McKenzie & van der Mars, 2015). As such, DO was cited as being the most comprehensive method for field measurement (Bailey et al., 1995). DO, is of course, not without faults. Observer training is intensive and requires multiple inter-rater observations to maintain reliability. Intensity can only be described qualitatively and cannot be measured in terms of energy expenditure. Observation also runs the risk of participant reactivity, although this can be reduced through multiple, noninvasive observations (Dollman et al., 2009). Measuring lesson context, instructor interactions, duration, intensity, and frequency of PA are important factors to capture for an overall evaluation (Sirard & Pate, 2001) and can be assessed by using DO measurement.

System for Observing Fitness Instruction Time

The System for Observing Fitness Instruction Time (SOFIT) is a multi-factor observation system designed to record several variables (physical activity intensity, lesson context, and instructor interaction) during a PE class in 20-second intervals (McKenzie, Sallis, & Nader, 1991). Twenty-second intervals (10-second observation and 10-second record periods) were found to be the most accurate when compared to 60s, 90s, 120s, and 180s intervals (McNamee & van der Mars, 2005). Momentary time sampling is a unique way to measure PA in children, as they are active intermittently rather than in

sustained bouts (Bailey et al., 1995; NASPE, 2004). Researchers have rigorously evaluated the reliability and validity of SOFIT in several age groups ranging from preschoolers through high school students (McNamee & van der Mars, 2005; Pope, Coleman, Gonzalez, Barron, & Heath, 2002; Rowe, Schuldheisz, & Van der Mars, 1997; Rowe, van der Mars, Schuldheisz, & Fox, 2004; Sharma, Chuang, Skala, & Atteberry, 2011).

SOFIT has been adapted for and validated in several environments: C-SOFIT (computerized version); SOPLAY (optional leisure time PA such as during school recess); SOPARC (PA in parks and playgrounds); and SOFIT-P (preschool-aged children). Despite all of these variations on the same measurement tool, to the best of the authors' knowledge, it has never been adapted to or tested in the recreation center environment. Given that the structure of PA classes at recreation centers is similar to PE classes in school (an instructor, guidelines for activity, and the activities themselves), it should be established whether or not SOFIT can be used to provide reliable evidence for recreation center PA programming.

Research Questions

Two research questions guided this study: (a) What is the relationship between the proportion of time spent in moderate-to-vigorous physical activity (MVPA) and lesson context for children aged 3 to 14?, and (b) What is the relationship between the proportion of time spent in MVPA and instructor interaction for children aged 3 to 14? A secondary goal was to determine if SOFIT could be used effectively in the recreation center environment.

Method

Research took place at Cardel Place in the city of Calgary, Alberta, Canada. Cardel Place is a nonprofit, charitable organization committed to healthy living, innovation and community building. As a regional recreation center built by the City of Calgary, it is a public facility. Cardel Place strives to achieve its mission of *Raising Healthier Generations* by being catalysts committed to helping shift community values, beliefs, attitudes and behaviors about physical inactivity and sedentary behavior. The Canadian Academy for Healthier Generations is the research and innovation arm of Cardel Place. The Academy focuses on pioneering innovative spaces, programs and services designed to make a measurable impact on the national crisis of physical inactivity and sedentary behavior.

This was the first of a four-phase study. Phase II will involve the observation and measurement of PE classes in a school with a high quality daily PE program. Phase II data will be used as a baseline of best practice for comparison with the recreation facility data. Phase III will evaluate the effectiveness of a new children's physical literacy program taught by experienced and highly trained recreation center professionals. The intervention protocol will be scrutinized and tested against a control group within the recreation facility. Finally, Phase IV will be the use of SOFIT within the recreation facility as an ongoing evaluation tool of the new programming structure.

Participants

Participants included children aged 3-14 enrolled in PA programs and the qualified instructors hired by the recreation center. As we did not collect personal information and we observed participants without knowledge of the study protocol, consent was not required. Instructors and participants who asked about the observer were told that they were simply there to watch the class. Very little interaction took place between observers and instructors or participants. The Mount Royal University Human Research Ethics Board approved this study.

Procedures

The Research Coordinator (RC; NVW), who is an expert in the SOFIT methodology conducted all training and reliability. The RC trained five undergraduate students from Mount Royal University working as research assistants (RAs) for the Canadian Academy for Healthier Generations as SOFIT observers. Training in SOFIT protocols began with the RC providing a detailed overview of the direct observation tool followed by the RAs

observing a pre-coded gold-standard training video segment. RA scores were compared to the scores provided on the training video. SOFIT protocol states that observers must maintain an 80% or better reliability rating. Inter-rater reliability was maintained throughout the study through occasional RC and RA co-observations of the same participants in one recreation center class (20/69 observation days). If the inter-rater agreement was less than 80%, the RA reviewed the training video tapes with the RC and discussed disagreements until they reached consensus. Inter-observer agreement ranged from 84-96%.

We collected data between January and May 2013. Each PA program was scheduled to be observed three times (once at the beginning of the session, once in the middle and once at the end) to obtain a broad representation of what took place in each program and to reduce lesson-to-lesson variability (such as more knowledge and skill generation in the early weeks compared to more game play in the later weeks). Due to the availability of research assistants and unforeseen circumstances, RAs observed some programs more or less frequently than anticipated (see Table 1). We selected PA programs with the intent of including a wide variety of sports and activities and of being representative of the programs offered in this particular recreation center. Both boys and girls were represented in all classes. Programs ran for 8 weeks and ranged from 45-60 minutes each. Class sizes ranged from 8-24 participants and the ratio of instructors to participants was 10:1. In classes where additional instructors were required, DO followed the lead instructor.

Table 1

Physical Activity Programs Selected for Observation Using SOFIT, Ages of Participants, and the Number of Days Each Class was Observed

Sport/Activity	Age of participants	Number of Observation days
Basketball	9-12	4
Basketball	6-8	3
Badminton	6-9	4
Badminton	10-14	3
Mini Tutu's Ballet	3-5	3
Tiny Tutu's Ballet	3-5	3
Wall Climbing	6-8	3
Wall Climbing	9-12	3
Urban Dance	6-9	4
Floor Hockey	6-8	3
Hapkido (Martial Arts)	7-9	4
Hapkido (Martial Arts)	7-9	3
Soccer	6-8	3
Soccer	9-12	4
Multisport	6-9	3
Zumba	7-11	3
Sportball	4-6	3
Gymnastics	6-8	4
Gymnastics	9-12	2
Triathlon	8-11	4

Data collection followed the SOFIT protocol (McKenzie et al., 1991); a brief description follows. Observers brought with them to each class a pen, a clipboard, SOFIT observation sheets, and a portable audio player with the prerecorded prompts. Observers randomly selected four participants, two boys and two girls, to observe throughout the 45-60 minute class. In addition, RAs chose a fifth participant in case one of the original four left or could not be located during an observation period. Each participant was observed for a total of four minutes in 20s intervals (10s observe, 10s record). Upon completion

of this observation, the focus shifted to another of the selected participants, eventually returning to the first participant to repeat the pattern. During the observation period, the RA observed and recorded PA while simultaneously observing and recording class context and instructor interaction.

PA is measured on a five-point hierarchical scale: 1) *lying down*, 2) *sitting*, 3) *standing*, 4) *walking*, and 5) *vigorous* (defined as more energy expenditure than an ordinary walk). MVPA is the sum of categories 4 and 5. The activity which took place at the 'record' prompt was recorded (for example, if a child was between activity levels at the prompt, the higher category was recorded). Lesson context consists of three nonhierarchical categories: *general content* (transition, management and break); *knowledge content* (primary focus is on the acquisition of knowledge related to PA, rules, strategy, and social behavior); and *PA motor content*, which is itself divided into *fitness* (such as endurance, strength, or flexibility); *skill practice* (primary goal is skill development, such as drills); *game play* (application of skills with little instructor involvement); and *free play* (instruction is not intended, and children may choose to participate or not). Instructor interactions can receive one of six hierarchical codes (#1 is most desirable): 1) *promotes fitness* (prompting or encouraging PA participation); 2) *demonstrates fitness* (models fitness engagement); 3) *instructs generally* (lectures, describes, prompts or provides feedback); 4) *manages* (participants or the environment in nonsubject matter tasks, such as set-up); 5) *observes* (monitors the group or an individual); and 6) *other task* (attends to events not related to the responsibilities of the class). The instructor interaction that took place anytime within the observation period that is most desirable was recorded (e.g., if promotes fitness and manages were both observed, then promotes fitness would be recorded).

Statistical Methods

A research assistant under the supervision of the Primary Investigator transcribed data from the scoring sheets to Excel. Every sixth entry was checked for reliability. Data were then exported from Excel into Stata S/E Version 13.0 for analysis (StataCorp, 2013). Descriptive statistics were conducted on the levels of PA, components of lesson context, and types of instructor interaction. We used the median and interquartile range since most of the variables had skewed distributions. Additionally, two new variables were constructed and described in a similar manner. The first variable was a summary measure for lesson context by calculating the sum of *fitness*, *skill*, *game play*, and *free play* (PA Content). The second variable was a summary of instructor interaction by adding the proportion of time in *demonstrates fitness* and *instructs generally* together (Teaching). Although individual age was not available for each child, data were available on the age range of each program, and that data was converted into three groups (youngest = 3-6 years; middle = 6-9 years; oldest = 9-14 years) and described with frequencies and percentages. The exception to this may be in the triathlon group where 8-year-olds were eligible to participate; however, we are unsure if an 8-year-old was observed since ages were not recorded. Understanding that there is an overlap in the age groups, children were not represented twice as age ranges were specific to individual classes. We summarized and analyzed all SOFIT program data as a whole and then broke it down for analysis by age group.

We developed multivariable linear regression models where the outcome was the proportion of time spent in MVPA on a linear scale. The primary predictor variable for each model was a component of lesson context or a component of instructor interaction. We considered age as a potential confounder. We also examined the possibility of an interaction between age and the predictor variable for each model. It was determined that age was associated with both the outcome and numerous predictor variables, thus all analyses and models were subsequently conducted and reported separately for each age group. A p -value of <0.05 was considered to be statistically significant for this Phase I study.

Results

We observed 21 different programs encompassing 14 distinct activities/sports between two and four times each, leading to 69 observation days. The observation days for each

category broke down as follows: 9 days observing the youngest participants (13%; three activities), 37 days observing the middle age participants (54%; nine activities), and 23 days observing the oldest participants (33%; 7 activities).

Figure 1 shows a stacked bar graph for the median percent of time spent in each PA category broken down by age group. Table 2 shows the percentage of time spent in each activity level, lesson context category and instructor interaction category for the full sample as well as by age category. None of the age groups spent any significant amount of time lying down. All age groups of children spent a large percentage of time standing as well as walking. The median proportion of time spent in MVPA increased as age increased: 30% (IQR: 24%-37%), 38% (IQR: 30%-43%), and 44% (IQR: 33%-54%) respectively. For lesson context, all activities focused a good proportion of time for knowledge development, ranging from 15-27% of time, and skill practice, ranging from 18-31% of time. The youngest age group had the most focus on these two categories as well as time spent in management (20%). The oldest age group spent 36% of their time in game play, which was much higher than the other two age categories at 10% and 4% respectively for the middle and young age groups. Instructors spent the majority of their time in general instruction and demonstration, with over 65% of time spent on these two categories alone. Additionally, the youngest participants received the most praise, while instructors observed the oldest group more than the other age groups. Instructors were rarely, if ever, seen engaging in off-task activities.

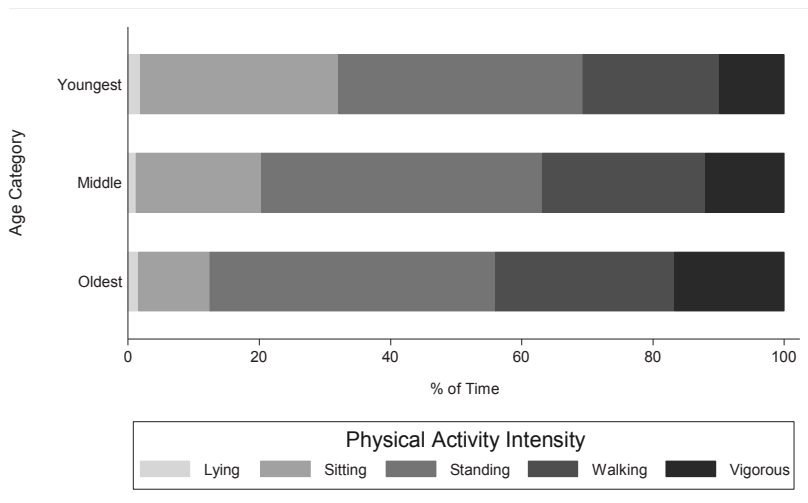


Figure 1. Stacked bar graph showing the percent of time spent in each physical activity category, by age group.

Table 3 shows the results of the linear regression modeling. In terms of lesson context, there were no predictors of MVPA in the youngest age group. For the middle age group, time spent in general content (transition, management and break; coef = 0.41; 95% CI = 0.01, 0.80; $p = 0.043$) and game play (coef = 0.18; 95% CI = 0.04, 0.32; $p = 0.013$) showed increasing effects on MVPA while the skill development showed a decreasing effect (coef = -0.16; 95% CI = -0.31, -0.02; $p = 0.030$). In the oldest age group, knowledge (coef = -1.21; 95% CI = -1.81, -0.62; $p < 0.001$) was a predictor of decreasing MVPA while general

content (coef = 1.13; 95% CI = 0.14, 2.11; $p = 0.027$) was a predictor of increasing MVPA. No instructor interactions predicted MVPA in the youngest and middle age groups. For the oldest age group, the instructor demonstrating was a positive predictor of MVPA (coef = -0.37; 95% CI = 0.05, 0.70; $p = 0.026$) while observing as a negative predictor (coef = -.69; 95% CI = -1.21, -.16; $p = .012$).

Table 2

Percent of Time Spent in Each Level of Physical Activity, Each Category of Lesson Context and Each Category of Teacher Behavior, by Age Group and Overall

	Youngest N=9 Median % of time (IQR)	Middle N=37 Median % of time (IQR)	Oldest N=23 Median % of time (IQR)	Total N=69 Median % of time (IQR)
Activity Level				
Lying	0% (0-2)	1% (0-1)	0% (0-1)	0% (0-1)
Sitting	25% (18-35)	20% (14-26)	7% (3-18)	18% (10-22)
Standing	40% (24-45)	38% (36-49)	45% (32-49)	42% (35-49)
Walking	22% (18-24)	27% (19-33)	28% (21-32)	26% (18-32)
Vigorous	9% (9-12)	10% (7-16)	15% (8-19)	11% (8-17)
MVPA	30% (24-37)	38% (30-43)	44% (33-54)	38% (30-45)
Lesson Context				
General	20% (15-26)	12% (8-16)	13% (9-18)	13% (8-20)
Knowledge	27% (22-29)	19% (15-25)	15% (11-21)	19% (14-25)
Fitness	11% (8-15)	6% (2-17)	2% (0-40)	7% (0-20)
Skills	31% (30-36)	29% (21-52)	18% (12-48)	29% (17-47)
Game Play	4% (3-6)	10% (0-28)	36% (6-46)	12% (3-37)
Free Play	0% (0-0)	0% (0-2)	0% (0-1)	0% (0-1)
PA Content	52% (51-57)	69% (58-72)	70% (66-78)	67% (57-72)
Instructor Interactions				
Praise	11% (8-12)	6% (3-10)	6% (4-8)	7% (4-10)
Demonstration	38% (25-42)	26% (15-30)	31% (16-39)	29% (16-34)
Instruction	40% (35-49)	46% (42-55)	38% (30-46)	43% (37-52)
Management	11% (9-12)	8% (4-15)	8% (2-17)	9% (3-16)
Observing	0% (0-4)	8% (5-16)	11% (3-23)	7% (3-16)
Other Task	0% (0-0)	0% (0-0)	0% (0-1)	0% (0-1)
Teaching	77% (73-81)	71% (66-77)	72% (49-83)	72% (64-79)

Note: MVPA = sum of walking and vigorous; PA Content = sum of fitness, skills, game play, free play; Teaching = sum of demonstrates and instructs
IQR = Interquartile Range

Discussion

Several goals of recreational PA programming exist including increasing time spent in physical activity, improving fitness, teaching skills that are useful for a lifetime, and providing a safe space for children to be active. Offering quality programs with purposeful and measurable outcomes that are developmentally appropriate should be a primary focus for the management team of any recreation center to improve quality and overall customer satisfaction. This study aimed to determine the proportion of time children enrolled in recreational PA programs spent in MVPA and the relationships between MVPA, lesson context and instructor interactions using the observational tool SOFIT. SOFIT has been proven to accurately measure student and instructor interactions in school-based PE classes. A secondary aim of this study was to determine if SOFIT could be used effectively in a recreation center to determine the levels of activity based on instructor interactions and lesson context. We also explored the role that management can play in improving PA outcomes.

Table 3

Linear Regression Results for the Association between Moderate-to-Vigorous Physical Activity and Each Predictor Variable

	Youngest N=9 Coef (95% CI)	p- value	Middle N=37 Coef (95% CI)	p-value	Oldest N=23 Coef (95% CI)	p-value
Lesson Context						
Knowledge	-0.22 (-1.03, 0.59)	0.538	-0.18 (-0.54, 0.19)	0.341	-1.21 (-1.81, -0.62)	<0.001**
General	0.14 (-0.99, 1.27)	0.775	0.41 (0.01, 0.80)	0.043*	1.13 (0.14, 2.11)	0.027*
Fitness	0.60 (-0.24, 1.44)	0.134	-0.15 (-0.36, 0.07)	0.171	0.30 (-0.05, 0.64)	0.087
Skills	-0.15 (-1.18, 0.89)	0.748	-0.16 (-0.31, -0.02)	0.030*	-0.28 (-0.58, 0.02)	0.065
Game Play	-0.86 (-2.90, 1.18)	0.351	0.18 (0.04, 0.32)	0.013*	0.13 (-0.18, 0.43)	0.395
Free Play	-0.82 (-3.92, 2.28)	0.551	0.14 (-0.23, 0.50)	0.453	2.57 (-3.60, 8.75)	0.396
PA Content	0.21 (-0.77, 1.18)	0.633	-0.09 (-0.37, 0.20)	0.541	0.61 (-0.15, 1.38)	0.110
Instructor Behavior						
Praises	0.50 (-1.19, 2.19)	0.507	0.23 (-0.28, 0.75)	0.368	0.49 (-1.38, 2.36)	0.589
Demonstrates	-0.09 (-0.60, 0.43)	0.707	-0.12 (-0.38, 0.15)	0.374	0.37 (0.05, 0.70)	0.026*
Instructs	-0.11 (-0.78, 0.55)	0.697	-0.04 (-0.35, 0.27)	0.786	-0.43 (-0.92, 0.06)	0.080
Observes	0.87 (-0.66, 2.39)	0.222	-0.25 (-0.56, 0.05)	0.098	-0.69 (-1.21, -0.16)	0.012*
Other Task	-15.73 (-37.11, 5.65)	0.126	1.66 (-0.27, 3.59)	0.089	1.87 (-0.84, 4.58)	0.166

* $p < 0.05$; ** $p < 0.001$

A plethora of evidence exists to suggest that activity levels vary by age (for example: Cragg & Cameron, 2006; Trost, Pate, & Sallis, 2002) and, due to motor development, that physical abilities differ by age. As such, we analyzed children enrolled in recreational PA programs by age group (3-6 years, 6-9 years and 8-14 years).

None of the age groups achieved the 50% MVPA guideline (US Department of Health and Human Services, 2000). Participants across all age groups spent the majority of class time either sitting or standing. Despite this, PA content (sum of *fitness, skill, game play, and free play*) accounted for the majority of the lesson context (median 67%). Other momentary time sampling observational protocols also reported low MVPA despite children being available for activity for the majority of the designated time (Keating, Kulinna, & Silverman, 1999; McKenzie et al., 1995; McKenzie et al., 1991; Scruggs et al., 2003; Sharma et al., 2011; Simons-Morton, Taylor, Snider, & Huang, 1993; Simons-Morton, Taylor, Snider, Huang, & Fulton, 1994). This indicates that although the opportunity exists for participants to be active, they are not seizing that opportunity, nor are the instructors doing a sufficient job at encouraging participation. The exception to this may be in the youngest group, where more instruction and management time may be necessary to lead a group of children who are possibly having their first foray into instructor-led PA.

One-third (range 28-47%) of the lesson context in this study focused on *general content* (transition, management and break) and *knowledge content* (acquisition of knowledge related to PA, rules, strategy and social behavior) where participants were expected to observe and listen to the instructor rather than participate actively. These results are not vastly different from school-based PE programs evaluated using SOFIT and other observational protocols which reported between 15% to 60% inactive class time (Curtner-Smith, Kerr, & Clapp, 1996; Keating et al., 1999; McKenzie et al., 1991; Parker & Curtner-Smith, 2005).

A negative relationship between a lesson context focused on knowledge acquisition and MVPA exists in the older children in this study. Knowledge generation can co-exist with active participation by creating a teaching model that is learner-centered rather than instructor-centered (Dyson, Griffin, & Hastie, 2004). Having the participants lead the drills and coach other participants could improve motivation and participation. Siedentop's theory of Sport Education outlines several ways to improve PA outcomes through learner-centered teaching including team building, which fosters the feeling of affiliation and allows participants to benefit from the social development that comes from being a part of a persistent group; record keeping to provide feedback, setting standards and motivating self-improvement; and celebrating each other's successes (Siedentop, 1994). A small group of grade seven boys (N=19) playing floor hockey using the sport education model achieved MVPA levels of 60% throughout the season even while learning skills, which is generally a time when activity levels are low (Hastie & Trost, 2002). Furthermore, pre-service PE teachers have expressed that using the learner-centered approach allowed them to focus more on student outcomes rather than on class management (Curtner-Smith & Sofo, 2004).

Siedentop (1994) posits that sport within PE does not adequately replicate the attractive features of sport in actual practice leading to boredom and irrelevancy and that the focus should be more on play. Children up to the early teen years prefer to sample several activities and focus on fun and enjoyment rather than training (Allender, Cowburn, & Foster, 2006; Macphail, Gorely, & Kirk, 2003). Recreational PA programming, too, tends to be based on a sport paradigm rather than one based in physical literacy (i.e., learning the basics of movement from a holistic perspective, and why it is important to be active). Activities that are more likely to carry forward into the arsenal of leisure time choices are actually not based in sport (such as team activities requiring equipment, space and officiating) but rather in individual or dual activities (such as running or tennis; Fairclough, Stratton, & Baldwin, 2002). By shifting the focus in recreation center programming toward activities that are more likely to be of long-term benefit, the short-term outcomes of benchmark achievement may be more readily realized.

Interestingly, in the present study, as *general content* (management, transitions and breaks) increased, so did MVPA. One possible explanation for this is that children took

this opportunity to “horse around.” While any increase in MVPA has a health benefit, maintaining control over the class so that everyone can enjoy and participate to their fullest is important. Students have shown that they prefer teachers to have clearly defined rules and that students should be held accountable to them (Chiu & Tulley, 1997). Having clearly defined rules should reduce behavior issues and the necessary time to manage these participants thereby allowing more time for organized PA (Weaver et al., 2012). Further to this, establishing routines (such as activity transitions and parent drop-off and pick-up) and practicing them regularly helps to clarify expectations and reduce management time (Emmer, Sanford, Evertson, Clements, & Martin, 1981; Weaver et al., 2012). Establishing consistent expectations across programs within the recreation center will make transitions from one activity to another seamless for staff and participants.

Skill development for the middle age group was a significant deterrent to MVPA and a similar trend was visible in the older age group. In a study of the effects of single-gender versus co-educational PE classes, girls-only classes tended to focus more on skill development to the detriment of MVPA whereas boys-only classes tended to favor more game play to the benefit of MVPA (McKenzie, Prochaska, Sallis, & Lamaster, 2004). Because children will come to recreational PA classes with a wide variety of skills, it may be difficult for the instructor to keep everyone sufficiently motivated during skill development. This is a predicament for participants, instructors, and management alike, as mastery of skill is associated with enjoyment of PA and participation in physical endeavors across all ages (Okely, Booth, & Patterson, 2001; Stodden et al., 2008; Wrotniak, Epstein, Dorn, Jones, & Kondilis, 2006). To exclude or limit skill development for the sake of MVPA offers limited benefit. From the perspective of management, policy and staff development that focus on promoting all aspects of PA—including those that may not increase MVPA in the moment but overall PA over time—are necessary.

Results from other research are inconsistent when it comes to which of *fitness*, *game play*, or *free play* is more efficacious at increasing MVPA. In this study, only game play in the middle age group showed a significantly positive relationship to MVPA ($p = .013$), while fitness showed a trend in the right direction for the oldest group ($p = .087$). When an emphasis was placed on fitness over free play, MVPA was higher in elementary school children (McKenzie et al., 1995) and Huberty et al. (2013) found that adult-led activities (such as fitness) garnered greater levels of MVPA than self-directed activities. Yet, Trost et al. (2008) and Coleman, Geller, Rosenkranz, & Dzewaltowski (2008) found that unstructured free play provided higher levels of MVPA in elementary-aged children during after-school programs than in organized adult-led sessions. This tells us that it is important to find a balance between all types of activities as each individual will respond differently to what is offered.

As the teacher interaction *observation* increased, MVPA in the oldest group decreased significantly. Contrary to this, as *demonstration* increased, so did MVPA. This speaks to the importance of active participation and modelling on the part of the instructors. In Huberty et al.'s (2013) study, both boys and girls responded favorably to teacher engagement in and promotion of the PA portion of an ASP, demonstrating more participation when the teacher was involved than when he or she was attending to other duties. Recreation center management can facilitate the ability of instructors to demonstrate and participate through competency-based training (CBT). CBT focuses on the demonstration of skills rather than the expression of knowledge. Staff training using this approach allows staff to be able to use their skills in a variety of settings such as with different age groups and various equipment (Weaver et al., 2012).

It is interesting to note that in this study, no statistically significant relationship exists between the instructor interaction *praise* and MVPA at any age. Despite the lack of significance on MVPA, offering praise and teaching participants to praise and encourage others is a valuable skill. Sportsmanship and respect for others is highly regarded, therefore, the tone that the facility and the instructors set is very important for the global development of the participants. As children age, sources of support change from parents and teachers to peers (Buhrmester & Furman, 1987; Eccles, 1999; McKenzie et al., 1997), therefore,

modeling how to encourage participation is not only important for the individual, but for the group as a whole. Furthermore, offering praise and encouragement for effort rather than achievement makes the PA environment more attractive (Parish & Treasure, 2003).

Weaver and colleagues (2012) developed the “5 Ms of Physical Activity Promotion in After-School Programs” which can easily be used in a recreation center setting. The conceptual framework is to define a Mission (policies and CBT) then Motivate (provide choice, develop confidence and celebrate efforts), Manage (safety, planfulness and supervision), and Monitor (assessment) to Maximize PA. Having a defined plan of action in place makes it easier for management to identify strengths and weaknesses in programming and to make improvements based on evidence rather than intuition. Furthermore, PA promotion policies are effective in increasing PA levels in children (Gortmaker et al., 2012; Sharpe et al., 2011).

Limitations

There are apparent differences in how researchers describe and define MVPA. For example, some researchers define moderate activity as walking (Huberty et al., 2013), whereas others define it as brisk walking (Simons-Morton et al., 1994), and others yet define it in terms of step counts per minute (Baggett et al., 2010; Scraggs et al., 2003) or METs (Hastie & Trost, 2002). In the present study, the SOFIT manual definition was used, and therefore moderate activity was considered walking, and vigorous activity was any greater energy expenditure than an ordinary walk (McKenzie et al., 1991). Care should be taken when interpreting MVPA results across studies to ensure that each definition is understood.

In order to maintain the 10:1 instructor-participant ratio, additional instructors or volunteers were present in classes. We recognize that this may confound results, as these additional instructors may have offered praise, instruction and demonstration that went unrecorded. We believe, however, that by maintaining a lower instructor-participant ratio, the lead instructor was better able to do his or her job and provide a more suitable environment for the enjoyment and participation of the attendees.

Another limitation is that certain activities require higher activity levels. Participants involved in wall climbing would not be expected to “run” up the climbing wall, and therefore may naturally exhibit lower PA levels than participants involved in floor hockey where running is expected. By examining many different activities and sports, we attempted to restrict the effects of those activities on either side of the spectrum to provide a broad perspective of what PA levels look like in this particular recreation center. Lastly, our study may be underpowered for detecting associations between MVPA and other variables due to small sample size, particularly in the youngest age group.

Conclusion

In the present study, we determined lesson context and instructor interactions had differing effects on MVPA outcomes depending on the age of participants. Knowing this gives management an area to focus on for in-service training. We also found that instructors in this recreation center were diligent at remaining on task. Giving instructors positive feedback encourages them to continue with the appropriate behaviors and creates a positive working environment.

This paper adds to the current body of literature as, to date, there are no published studies on the use of the observational measure SOFIT in the recreation center environment. The closest comparison to a recreation center would be the ASP, however, the majority of PA studies from the ASP setting have suffered from low attendance and poor research design (for a review see: Timperio, Salmon, & Ball, 2004). The current research is robust in its design and implementation and represents the first of four phases of data collection. This study was able to demonstrate that SOFIT is an effective tool to measure PA in the recreation center. Future considerations are to analyze results by gender, as it is well known that boys and girls exhibit different activity patterns.

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