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# Constructs of physical activity behaviour in children: The usefulness of Social Cognitive Theory

Ernesto Ramirez [a], Pamela Hodges Kulinna [b,*], Donetta Cothran [c]

[a] University of California San Diego, San Diego, CA, USA
[b] Arizona State University, USA
[c] Indiana University, USA

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ABSTRACT

*Objectives:* The purpose of this study was to investigate the relationships among several Social Cognitive Theory (Bandura, 2004) constructs (e.g., self-efficacy) and children's physical activity behaviours.
*Design:* Children from six elementary schools ($N = 479$) in grades 4th to 6th from five different school districts in the Southwestern USA participated in this study by completing a sociocognitive instrument as well as wearing a pedometer for five school days.
*Methods:* Previously validated scales were combined and administered to all children in order to examine the relationships among five constructs (self-efficacy, outcome expectations, social support, barriers, and goals) and physical activity participation was measured via pedometer. Data analyses included a two-step approach with confirmatory factor analysis followed by structural equation modelling.
*Results:* The confirmatory factor analyses indicated an adequate fit of the specified model. The structural model fit statistics also suggested that the data fit the specified model: $\chi^2$ (8, $N = 476$) = 24.44, $p = 0.00$, $\chi^2/df = 3.06$, GFI = 0.98, AGFI = 0.96, CFI = 0.93, RMSEA = 0.07. The model explained 15% of the variance in social support, 11% of the variance in goals, 11% of the variance in barriers, 9% of the variance in outcome expectations, and 2% of the variance in physical activity. Self-efficacy was a strong predictor of total social support, total number of barriers, and outcome expectations.
*Conclusions:* This study supports the use of Social Cognitive Theory in understanding the constructs of physical activity behaviour in children, however, very little variance in behaviours was explained. There is a need to also investigate environmental influences on children's decisions to be physically active.
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## Public health concerns

The physical health of children and adolescents, and particularly the rising rates of overweight, obesity and weight-related diseases in younger populations have received considerable attention over the last decade. Many children and youth are not meeting the 2008 US Department of Health and Human Services ([USDHHS, 2010]) recommended physical activity guidelines, which call for at least 60 min of physical activity per day. Suspected contributing factors to this alarming trend include reductions in time spent in physically active behaviours, decreased access to physical education in the school environment, increased caloric intake, and increased time spent in sedentary behaviours. Children in the USA have the highest prevalence of being overweight in the world, with the National Health and Nutrition Examination Survey (NHANES) data showing a 3-fold increase in overweight children in the last 40 years (CDC, 2009).

To combat the youth overweight and obesity issue, it is important to establish successful physical activity interventions to not only change physical activity participation patterns, but also to create long-lasting change in sociocognitive perceptions and behaviour. Boreham and Riddoch (2001) expressed the need for increased physical activity during childhood. They indicated that children who are more physically active are healthier and show a trend towards continuing activity and improved health into adulthood. Stice, Shaw, and Marti (2006) studied weight gain prevention effects in a meta-analysis of 46 studies and found that 21% of the studies had significant prevention effects, with larger effects found for children and adolescence. A recent review of 51 studies examining school-based physical activity interventions found that 40 studies reported positive effects for factors related to physical health and psychological factors related to physical activity participation. For instance, the school-based interventions found

* Corresponding author. Arizona State University, Mary Lou Fulton Teachers College, 7001 E. Williams Field Road, Santa Catalina Hall, Room 330Q, Mesa, AZ 85212, USA. Tel.: +1 480 727 1767; fax: +1 480 727 5267.
*E-mail address:* pkulinna@asu.edu (P.H. Kulinna).

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positive changes in BMI, blood pressure profiles, fasting blood glucose, knowledge of proper nutrition, and attitude towards physical activity (Shaya, Flores, Gbarayor, & Wang, 2008). In creating effective interventions, it is important to better understand what physical and psychosocial variables determine participation in health-enhancing physical activity. Interventions that target these mediators may be more effective in creating long-term behaviour change. Social Cognitive Theory (Bandura, 2004) is a useful psychosocial model for examining the sociocognitive constructs of physical activity in children and youth. The current study sought to investigate the relationship between several constructs of the specific model and objectively measured physical activity.

*Social Cognitive Theory*

Banduras's (1986) Social Cognitive Theory identifies personal, behavioural and environmental factors that influence people's behaviours. Bandura (2004) also used the model to promote healthy behaviour adoption and disease prevention. Personal factors consist of knowledge, perceived self-efficacy, and outcome expectations related to the behaviour adoption. Note that knowledge was not measured in the current study (due to school district limitations). Behavioural factors include proximal and distal goals while environmental factors include barriers and support.

Personal factors, including "beliefs of personal efficacy play a central role in personal change. This focal belief is the foundation of human motivation and action" (Bandura, 2004, p. 3). People must believe (or be efficacious) that they have the power to enact change (e.g., to be physically active) in order for it to happen. This construct measures an individual's perceived ability to overcome challenges and deficits that may influence behaviour. Outcome expectations also influence behaviours and are directly related to the individual's beliefs about costs and benefits of the behaviour. When outcome expectations are more positive, there is a greater chance of engagement in the behaviour (Bandura, 2004).

Behavioural factors also influence change in healthy behaviour practices (including the development of proximal and distal goals). Short-term attainable goals are the most effective in enacting behaviour changes. This construct reflects the plans or goals an individual develops to carry out the behaviour at a future point (Bandura, 2004).

Finally, environmental factors that influence behaviour include social support and barriers to behaviour adoption. Social support is concerned with how and to what extent others help to facilitate and influence an individual's engagement in specific behaviours. Support from others can help to facilitate change and provide a positive foundation for other key constructs/predictors of behaviour. Schools are unique environmental settings, where social interactions can greatly influence student behaviours. Necessary components of schooling include students learning how to regulate their personal emotions and to positively interact with others (ten Dam & Volman, 2007). When students learn effective social interactions in school settings, these lifelong skills have positive implications on their learning achievement and psychological well-being (Wentzel, 2005).

Environmental barriers, ranging from personal, to social and structural, directly measure effects of different impediments to engaging in the desired behaviour. The greater the number of barriers or impediments to change, the less likely it is that individuals will engage in the behaviour.

Each of these constructs (i.e., self-efficacy, outcome expectations, knowledge, goals, social support, barriers) plays a crucial role in the facilitation of behaviour change. The primary determinant and the focus of the Social Cognitive Theory, however, is self-efficacy. The more efficacious individuals are about their planned actions and behaviours, the more likely they are to engage in them on a habitual level. Additionally, self-efficacy is regarded as the primary factor because of its involvement in the determination of each successive variable in Social Cognitive Theory. This is evident in individuals who are highly efficacious, as they tend to expect favourable outcomes, overcome barriers, and have a stronger commitment to the goals they set. Social Cognitive Theory as a whole is very similar and overlaps with other widely used predictive models of behaviour. Perhaps the reason it excels, though, is through the use of grounded theoretical principles, which can be targeted through interventions in order to increase healthy habits (Bandura, 1997; Motl, 2007).

Social Cognitive Theory constructs have been associated with physical activity behaviours. Specifically, interventions to increase self-efficacy (and other Social Cognitive Theory constructs) have led to increased physical activity behaviours. Positive relationships have been found for children's self-efficacy and outcome expectations with physical activity behaviours (Heitzler, Martina, Dukeb, & Huhmana, 2006). In addition, positive relationships have been found among children's perceived parental support, self-efficacy and physical activity behaviours. Similarly, adolescents' perceived self-efficacy, goals, perceived benefits, family influence, and friend support have been shown to have positive relationships with their physical activity behaviours (Horst, Chin, Twisk, & Mechelen, 2007).

One limitation of these previous studies, however, has been that the measurements of the constructs of outcome expectations and behaviours have been conducted primarily for adolescents and adults. The childhood period has been identified as a key time during which sedentary behaviours become much more evident. This developmental period also marks a key juncture in development of habitual behaviour. If health-enhancing physical activity can be ingrained as an accepted habitual behaviour prior to adolescence, it is probable that lifelong physical activity and its potential health benefits could be more easily realized (Telama et al., 2005). The current study addresses the paucity of data on outcome expectations and physical activity in children by studying sociocognitive variables and their relationships with objectively measured physical activity behaviours in a large diverse sample of fourth to sixth grade children.

Specifically, the purpose of this study was to examine the associations between sociocognitive constructs and physical activity behaviour in children (ages 8–14). First, it was hypothesized that an instrument, developed from instruments used in previous studies in the field, would provide a good fit for the structural path of Social Cognitive Theory proposed by Bandura (2004). Second, it was hypothesized that the five included sociocognitive constructs would be significantly related to physical activity behaviours. Finding support for social-cognitive constructs of physical activity behaviour in children will guide future interventions that can focus on addressing the key factors of developing physical activity behaviours.

## Methods

*Participants*

This study presents cross-sectional data from a study examining the relationships between SCT constructs and physical activity behaviour among elementary school age children. Children from six elementary schools across five different school districts in one Southwestern state in the USA participated in this study. These schools were selected for inclusion based on their participation in a separate and subsequent physical education intervention study and thus were a convenience sample (Kulinna, Jahn, Brusseau,

Ferry, & Ramirez, 2008). Schools targeted fourth- and fifth-grade students; however, some schools used additional grades to meet the participation level target of 150 students per school. Administrators and teachers at each school recruited the participants. The parent or guardian provided informed consent and each child participant provided assent. Human Subjects approval was obtained from the University Internal Review Board and the participating school districts prior to study initiation.

### *Instrumentation for Social Cognitive Theory measures*

#### *Protocol for the instrument administration*

At the six schools, a research team member or a trained teacher (not associated with student instruction) administered the sociocognitive instrument with students following along individually; either completing sections of the instrument individually or completing the entire instrument at once, depending on the survey administrator, classroom context, and schedule. The complete sociocognitive instrument (including measures not applicable to this paper) consisted of 70 items. Each measure on the survey was preceded by clear verbal and written instructions. Students at each of the six schools completed the instrument during the same week as pedometer data collection.

#### *All instrument items*

Following recommendations from Bandura (2004), slight modifications were made to the measures to reflect temporal agreement across all subscales (e.g., "on most days") on the sociocognitive instrument. Following recommendations from Saunders et al. (1997) based on his work with fifth-grade students, items on the self-efficacy, social support, outcome expectations, and barriers subscales were set to a Yes/No scale rather than a Likert-like five point scale. Although this decreased the amount of observed variance, it was deemed necessary to reduce participant burden as well as to make the instrument more comprehendible for this 4th–6th grade student population.

#### *Social support, self-efficacy, and outcome expectations*

The social support subscale, self-efficacy subscale, and outcome expectations subscale were derived from Saunders et al. (1997).The social support subscale (eight items) was a measure of social influences. Influences were assessed by determining if the child believed that a friend or his/her family "thinks" they should be active, "encourages" them to be active, or "participates" in the activity with the child (e.g., "*A friend has offered to be physically active with me in the past two weeks*"). The self-efficacy measure (12 items) assessed whether a child had confidence in overcoming specific barriers to participating in physical activity. For example, it included items that assessed the child's confidence in overcoming poor weather and alternative sedentary activities (e.g., "*I think I can be physically active after school even if I could watch TV or play video games instead.*"). Lastly, the outcomes expectations measure (16 items) addressed perceived outcomes from engaging in physical activity. Outcome expectations included in the scale related to the effects of physical activity on health, sports abilities, and physical appearance, (e.g., "*If I were to be physically active most days it would make me better in sports.*"). Validation efforts (Saunders, 1997) included internal consistency reliability analyses completed for each of these three subscales using a large ($N = 421$) cohort of fifth-grade students. Internal consistency reliability and test–retest values for each of the measures were reported as acceptable (Saunders reported mostly $\alpha > 0.70$ for the constructs).

#### *Barriers*

From Zabinski, Saelens, Stein, Hayden-Wade, and Wilfley (2003), the 21-item barriers to physical activity subscale was included in the current sociocognitive instrument. Five different categories of barriers were measured, including body-related, convenience, resource, social, and fitness (e.g. "*I am self-conscious of my body when I do physical activity.*"). Acceptable internal consistency reliability was also reported by Zabinski with Cronbach's $\alpha$ ranging from 0.58 (small number of items) to 0.92 for the five categories of barriers.

#### *Goals*

One item was used to measure students' goals on the sociocognitive instrument to capture how sure the child was that they would, on most days, participate in any physical activity during their free time. The goal item was created as recommended by Ajzen (1991) for assessing goals to participate in physical activity and was also similar to the intention to be physical active items used with children by Kodish, Kulinna, Martin, Pangrazi, and Darst (2006). In response to the question, "*Think about your free time in the next two weeks*", children responded "*I will not be physically active*", "*I probably will not be physically active*", "*I may or may not be physically active*", "*I probably will be physically active*" and "*I am sure that I will be physically active*".

#### *Instrument validation for the current study*

A pilot study was conducted with one class of fifth-grade students with the combined sociocognitive instrument to make sure that the allocated 20–30 min of time was adequate to complete the instrument. It was also conducted to ask students if they had any questions about the items. Students reported that all of the questions were clear and easy to understand.

For the current study ($N = 479$), internal consistency reliability was also assessed for each of the measures and for the overall sociocognitive instrument. Each construct demonstrated moderate to strong internal consistency reliability with alpha values ranging from 0.42 to 0.90 (see Table 2). The complete sociocognitive instrument also demonstrated adequate internal consistency ($\alpha = 0.77$), exceeding Nunnally's (1978) minimal criteria of 0.70 for research studies.

### *Instrumentation for measuring physical activity behaviours: pedometry*

Average pedometer data (24 h) collected for five days was used as the physical activity behaviour measure for this study. Pedometers have recently had increased international support as a viable tool for estimating physical activity levels of children and youth in field settings (Tudor-Locke, Williams, Reis, & Pluto, 2002). Pedometers measure vertical oscillations of body movement at the hip, providing a total count of accumulated ambulatory movement of steps taken.

Since the Yamax SW-200 is considered the "gold standard" instrument for the measurement of children's PA levels in field settings (McKee, Boreham, Murphy, & Nevill, 2005), it was used in this study. The following pedometer protocol was adopted from previous research reports (Tudor-Locke, Lee, Morgan, Beighle, & Pangrazi, 2006) and included the following preparations: (a) changing all batteries, (b) performing a series of shake tests to ensure correct calibration of the pedometers, and (c) having all participants complete a step test for pedometer accuracy prior to data collection. Students were assigned pedometer numbers. If students did not return, lost, or tampered with pedometers, they were removed from the data collection process (<5% at each school).

Also, prior to pedometer data collection, participating teachers and administrators were familiarized with pedometers and the procedures that would be utilized for data collection. Most of the students had used pedometers in their physical education

programs previously. Classroom or physical education teachers provided more practice opportunities with pedometers prior to data collection in order to limit reactivity. Lastly, a short review orientation (5 min) was used on the day data collection began in order to remind students and teachers of the protocol and procedures. Students were asked to wear the pedometer over their right knee to maintain consistency in data collection; however, previous studies have shown no differences between attachment sites in elementary school children participants (Ramirez-Marrero, Smith, Sherman, & Kirby, 2005). Students were reminded about the ideal location for pedometer attachment, its removal while sleeping and for water activities, as well as reattaching their pedometer in the morning. Instructions said to wear pedometer during all other times as well as to do their normal activities.

Pedometer data collection took place over five consecutive school days with the research team present all day at the schools during data collection in order to give instructions, handle equipment issues, and prompt students to record data or comply with the protocol at all six schools. Each morning (i.e., beginning of the school day), students were prompted to record their pedometer step counts as well as to reset their pedometer for the current day. Members of the research team visually checked students' pedometer placements and students were asked to replace pedometers if they were not positioned accurately. Research team members also scanned student responses on forms throughout each day and questioned children if data appeared unusual. Further, validation checks were also conducted by having each child complete a brief survey about their previous day's physical activity, which were also scanned by the research team members daily at the schools, with all different or extreme responses checked with the children. The process was repeated for each of the five days at all six schools.

### *Data analysis*

Five items in the Outcome Expectation scale were reverse coded as they reflected negative outcomes (e.g., "*Physical activity would make me get hurt*"). For the categorical items assessing goals, an alternative coding scheme was used (1–5 based on response selected; also see Table 3). For the physical activity behaviour measure (pedometer steps), established procedures were followed (Rowe, Mahar, Raedeke, & Lore, 2004), including a minimum of two weekdays of data present to include participants in the analyses. Means for total steps/24 h were computed for each participant. There were 14 students with only one day of pedometer data. This resulted in 3% of student data being excluded from the analyses.

### *Confirmatory factor analyses and structural equation modelling*

We used a three-step procedure in order to test the model fit. First, we assessed the factor structure of the scales used in the analysis. Item responses from each scale were submitted to a Principal Components Analysis (PCA) with varimax rotation to examine the item structure. Second, we used factor sum scores to conduct a confirmatory factor analysis in order to assess the measurement model of the proposed structural model. Only self-efficacy, outcome expectations, barriers, and social support were assessed as latent variables due to the one-item representation of both goals and our behavioural measure (pedometry). Lastly, SEM was used to determine associations between self-efficacy and physical activity participation. The structural model was tested using the path structure described by Bandura (2004; see Fig. 1). In this model self-efficacy is the lone endogenous variable predicting outcome expectations, barriers, social support, goals, and physical activity measured via pedometer. Outcome expectations, barriers, and social support are also predictors of goals, which in turn are predictors of physical activity. SPSS (v17.0) and AMOS (v16.0) structural equation modelling software were used in order to conduct the data analyses.

Model fit was assessed using a variety of commonly used fit criteria and indices. The $\chi^2$ assesses the absolute fit of the structural model. The statistic $\chi^2$/df can be used to indicate fit (taking into account sample size), with values between two and five indicating good fit (Kelloway, 1998). The root mean square error of approximations (RMSEA) is a test of the closeness of fit. RMSEA values approximating 0.05 indicate that a model has good fit, values $< 0.08$ indicate moderate fit, and values $< 0.1$ indicate mediocre fit (Brown

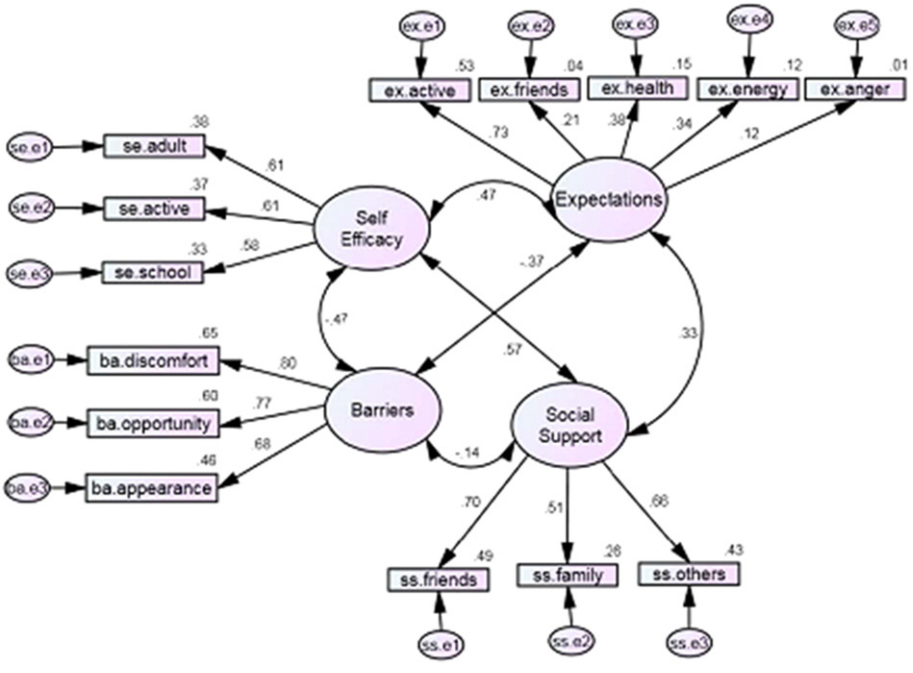


**Fig. 1.** Confirmatory factor analysis of social-cognitive constructs.

& Cudeck, 1993; Hu & Bentler, 1999). Goodness of Fit (GFI), Adjusted Goodness of Fit (AGFI), and the Comparative Fit Index (CFI) were also used to assess fit. For each of these indices, values above 0.90 indicate an acceptable fit, and values above 0.95 indicate good fit (Hu & Bentler, 1999).

## Results

The sample included 479 children (mean age = 9.8 yrs.) from six elementary (4th–6th grade students) schools in five different school districts in the Southwestern USA. The children reported their ethnic origin as Caucasian (44.1%), Hispanic American (36.2%), African American (7.4%), Native American (3.9%), Asian/Pacific American (1.7%), Arab American (0.3%), or other (6.3%). Male (50.1%) and female (49.9%) students were equally represented in the study. Body Mass Index (BMI) for the group ranged from 11.65 to 38. 29 ($M = 19.37$, SD = 4.18). The context for the six elementary schools is depicted in Table 1.

The sociocognitive instrument and physical activity descriptive statistics results are presented by measure in Table 3 and the ranges for each scale are available in Table 2. Results suggest that these children were participating in typical physical activity patterns for USA children. Guidelines for youth daily steps counts are 13,000 for boys and 11,000 for girls (Pangrazi, Beighle, & Sidman, 2003).

The current sample overall mean for daily steps was 12,246.79 (SD = 3579.56; range = 1830–27,758). Boys were more active with mean daily steps of 13,011.72 (SD = 3886.84) while girls had mean daily steps of 11,237.98 (SD = 3149.99). Results also suggested that students had strong goals, mostly positive views of their social support, perceived few barriers, had strong positive outcome expectations for being physically active and had high levels of self-efficacy about being physically active on most days.

### *Factor analysis*

Each subscale was analyzed separately. For each subscale, the parallel analysis method was used to estimate the amount variance explained by the factor solution. For the self-efficacy (SE) subscale, a three-component solution accounted for 49% of the variance. The items for each of three components were examined and labelled as SE-Adult (loadings range 0.64–0.79), SE-School (loadings range 0.45–0.74), and SE-Active (loadings range 0.64–0.76). For the outcome expectations (EX) scale, a five-component solution accounted for 51% of the variance. The items loading on each of the components were examined and labelled accordingly. Items were examined and the five components labelled as EX-Active (loadings range 0.54–0.67), EX-Friends (loading range 0.58–0.74), EX-Health (loadings range 0.41–0.73), EX-Energy (loadings range 0.41–0.74), and EX-Anger (one item, loading = 0.80). For the barriers (BA) scale, a three-component solution was identified that accounted for 47% of the variance. Items were examined and the resulting components were labelled as BA-Discomfort (loadings range 0.44–0.75), BA-Opportunity (loadings range 0.44–0.67), and BA-Appearance (loadings range 0.55–0.71). For the social support (SS) subscale, a three-component solution accounted for 49% of the variance. Items were examined and the three components were labelled as SS-Friends (loadings range 0.44–0.76), SS-Family (loading range 0.64–0.79), and SS-Others (loadings range 0.45–0.67). Reliability analysis (Cronbach's alpha) was conducted on each subscale and the combined subscales (constructs). For the identified subscales, reliability ranged from 0.41 (SE-School) to 0.84 (BA-Opportunity). Internal reliability results for each subscale and combined construct are presented in Table 2.

**Table 2**
Internal reliability for constructs and subscales.

| Constructs and subscales | # of Items | Cronbach's $\alpha$ | Response options | Range |
|---|---|---|---|---|
| Self-efficacy (SE) | 12 | 0.76 | Yes/no | 0–12 |
| SE-Adult | 4 | 0.73 | | |
| SE-Active | 5 | 0.59 | | |
| SE-School | 3 | 0.41 | | |
| Outcome expectations (EX) | 16 | 0.60 | Yes/no | 2–16 |
| EX-Active | 4 | 0.56 | | |
| EX-Friends | 4 | 0.55 | | |
| EX-Health | 3 | 0.45 | | |
| EX-Energy | 4 | 0.46 | | |
| EX-Anger | 1 | NA | | |
| Barriers (BA) | 21 | 0.77 | Yes/no | 0–21 |
| BA-Opportunity | 10 | 0.84 | | |
| BA-Discomfort | 7 | 0.79 | | |
| BA-Appearance | 4 | 0.71 | | |
| Social support (SS) | 8 | 0.73 | Yes/no | 0–8 |
| SS-Friends | 3 | 0.67 | | |
| BA-Family | 2 | 0.76 | | |
| BA-Other | 3 | 0.51 | | |
| Goals | 1 | NA | Check the response "that describes you best" | |

**Table 1**
Characteristics of participating schools.

| School | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| % Free & reduced lunch | 27.67 | 72.94 | 90.58 | 31.8 | 37.14 | 60.31 |
| School designation | Rural distant | Rural remote | City large | City large | Suburb large | City small |
| Community population | 2484 | 1457 | 447,541 | 1,512,986 | 32,205 | 169,712 |
| % Free & reduced lunch | 27.67 | 72.94 | 90.58 | 31.8 | 37.14 | 60.31 |
| Teachers (FTE) | 46.5 | 11.0 | 40.1 | 42.5 | 51.7 | 27.7 |
| PE number of times weekly | 1 | 1 | 2 | 2 | 2 | 2 |
| Recess number of times weekly | 5 | 5 | 10 (2 × day) | 10 (2 × day) | 5 | 5 |
| Community population | 2,484 | 1,457 | 447,541 | 1,512,986 | 32,205 | 169,712 |
| Total students | 629 | 183 | 710 | 746 | 1131 | 418 |
| Participants in the current study | 105 | 64 | 116 | 105 | 35 | 71 |
| Grades | PK–5 | PK–8 | K–6 | PK–5 | PK–8 | PK–5 |
| Ethnicity | C = 481 | C = 101 | C = 38 | C = 439 | C = 762 | C = 162 |
| | H = 115 | H = 79 | H = 607 | H = 172 | H = 199 | H = 116 |
| | B = 18 | B = 1 | B = 24 | B = 63 | B = 100 | B = 82 |
| | A = 10 | A = 2 | A = 9 | A = 37 | A = 37 | A = 23 |
| | N = 5 | N = 0 | N = 32 | N = 35 | N = 33 | N = 35 |

Note. Two students were not identified by school. Data gathered from the schools or national population statistics reports. Ethnicity codes represent: C = Caucasian, H = Hispanic, B = Black Non-Hispanic, A = Asian/Pacific Islander, N = American Indian/Alaskan Native.

**Table 3**
Intercorrelations and descriptives for social-cognitive factors.

| Variable | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Average weekday steps | – | | | | | |
| 2. Goals[a] | 0.13** | – | | | | |
| 3. Social support | 0.06 | 0.25** | – | | | |
| 4. Barriers | −0.10* | −0.12** | −0.09* | – | | |
| 5. Outcome expectations | −0.01 | 0.19** | 0.28** | −0.10* | – | |
| 6. Self-efficacy | 0.10* | 0.32** | 0.41** | −0.31** | 0.26** | – |
| *M* | 12,246.74 | 4.23 | 5.97 | 3.75 | 12.57 | 10.30 |
| SD | 3679.56 | 0.92 | 2.04 | 4.42 | 2.32 | 2.08 |

Note. *$p < 0.05$, **$p < 0.001$.
[a] Coding for the Goals item was: will not = 1, probably will not = 2, may or may not = 3, probably will = 4 and sure I will = 5. Means and standard deviations are based on frequency counts for dichotomous items (variables 3–6).

### *Confirmatory factor analysis*

Direct paths to the latent variables from the self-efficacy, outcome expectations, barriers, and social support latent variables to their respective subscales were specified (see Fig. 1). Interfactor correlations between all latent variables were allowed in the model specification. Fit statistics indicated that the specified model fit reasonably well: $\chi^2$ (71, $N = 476$) = 249.85, $p = 0.00$, $\chi^2$/df = 3.52, GFI = 0.94, AGFI = 0.91, CFI = 0.89, RMSEA = 0.06.

### *Structural model findings*

Fit statistics indicated that the data fit the specified model: $\chi^2$ (8, $N = 476$) = 24.44, $p = 0.00$, $\chi^2$/df = 3.06, GFI = 0.98, AGFI = 0.96, CFI = 0.93, RMSEA = 0.07. Standardized path estimates ranged from −0.33 to 0.38 (see Fig. 2). All path estimates were significant with the exception of the path from barriers to goals and the path from self-efficacy to physical activity. These two paths were subsequently removed from the model. In addition, the model explained 15% of the variance in social support, 11% of the variance in goals, 11% of the variance in barriers, 9% of the variance in outcome expectations, and 2% of variance in physical activity.

## Discussion

### *Social Cognitive Theory model*

These data derived from the combined sociocognitive instrument fit the specified Social Cognitive Theory model developed by Bandura (2004). However, the Social Cognitive Theory constructs only accounted for a small proportion of the variance in physical activity behaviours (2%). Four of the constructs (self-efficacy, outcomes expectations, social support, goals) were found to be predictors of physical activity. The only non-significant predictor was barriers. In a similar study using Social Cognitive Theory with Arab American children, Martin and his colleagues also reported that the social-cognitive variables explained little of the variance (9%) in self-reported moderate-to-vigorous physical activity (Martin, McCaughtry, & Shen, 2008). It may be necessary to combine models and/or include other ecological components (e.g., policies, community issues) in order to explain more of the variance in children's physical activity patterns using sociocognitive theories (e.g., Hagger, 2009).

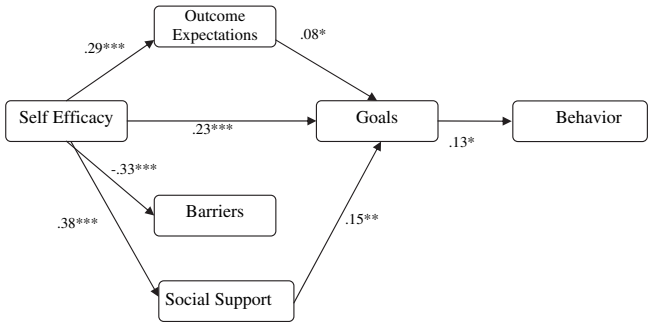


**Fig. 2.** Social Cognitive Theory path diagram. Note: all path estimates are standardized. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

In this study, it was difficult to link cognitive variables and behaviour outcomes. The challenges of associating measured cognitive variables and behaviour outcomes in children are not new. Baranowski, Anderson, and Carmack (1998) highlighted the importance of measuring cognitions in the context of what children can understand and reply to appropriately. In the same way, Burgess (2010) and Hagger (2009) suggests that using only one theoretical model to predict children and youth's motivation and physical activity may not be appropriate due to the vast differences in motivation and participation. Perhaps looking beyond traditional psychological models of behaviour and/or using these in conjunction with broader social-ecological models (e.g., Sallis & Owen, 2002) that incorporate determinants at multiple levels (policy, environment, etc.) will provide a richer understanding of contextual determinants of children's physical activity participation.

The context of physical activity is also important to consider in light of the study's findings. Children, in many situations lack control over their behaviours, and in these cases social-cognitive determinants may not provide sufficient insight into behaviour. Children, for example, cannot control the number of days of Physical Education per week they have or the content taught in Physical Education classes. There are numerous obstacles that may prevent children from obtaining recommended levels of physical activity. Many children have limited access to structured physical activity environments (e.g., youth sport programming) as well as non-structured physical activity environments (e.g., parks, walking trails). These limitations in physical activity opportunities may be due to adult regulations, inclement weather, time, safety, fiscal restraints, and limited programming (McKenzie, Marshall, Sallis, & Conway, 2000).

### *Sociocognitive constructs & physical activity*

#### *Goals*

Many of the children in this study had goals to be physically active during their free time, and this finding was supported by their pedometer determined physical activity patterns. A large ($N = 3114$) national random sample of similarly aged children (9–13 yrs.) found 65.6% participated in three or more bouts of physical activity during their free time during the previous week (Heitzler et al., 2006). Data on children (9–11 yrs.) from the NHANES surveys revealed that, on average, boys and girls participate in 7.1. and 6.2 bouts of active play each week, respectively (Anderson, Economos, & Must, 2008). These large cross-sectional studies suggest that children are frequently engaging in free time physical activity of moderate-to-vigorous intensity (i.e., that makes them sweat or breathe hard).

#### *Barriers*

The children in the present sample reported few barriers to being physically active, with the most often cited barriers to physical activity being a lack of a convenient place or friends/family members to participate with them. This finding echoes the results of the study conducted by Zabinski et al. (2003) on barriers to

physical activity in overweight children, where "too much homework", "lack of a place to play or someone to play with", and "students' being self-conscious of their body while being physically active" were the barriers most frequently reported.

*Social support*

The current study's findings for the social support construct showed that, on average, children were likely to report being encouraged to be active by their family, but it was not as likely for them to report that their families were physically active with them. On the other hand, engaging in activity with friends was reported more often than receiving encouragement to be active from friends. These findings may indicate that in order to overcome barriers to activity such as being alone, it is important to persuade *both* friends and family to be active with children during their free time as well as to encourage physical activity. Both encouragement of and participation in physical activity by family and friends has been found consistently to be positively correlated with physical activity in youth (Gustafson & Rhodes, 2006; Springer, Kelder, & Hoelscher, 2006). Furthermore, for youth, the presence of a friend has been shown to increase motivation to be active as well as to increase the amount of physical activity completed (Salvy et al., 2009).

*Outcome expectations*

Our findings indicated that children held appropriate outcome expectations regarding the positive and negative outcomes associated with physical activity. Of the five outcome expectations related to negative outcomes, on average, the children in this sample responded yes to only one. This is analogous to responding yes on average to approximately nine of the 12 remaining positive outcome expectations. Previous studies have found outcome expectations to be significantly correlated with self-report and objectively measured physical activity behaviours (Heitzler et al., 2006; Trost, Pate, Ward, Sauders, & Riner, 1999). One reason for the lower levels of internal consistency reliability for this construct may have been the use of both positive and negative items on the scale.

*Sociocognitive perceptions*

As stated previously, there is a lack of research on the determinants of physical activity behaviours in children, and particularly on children's sociocognitive perceptions. The results from this study indicate that Social Cognitive Theory can be a useful and valid model for the examination of relationships among Social Cognitive Theory constructs and physical activity behaviours in children. A clear understanding of constructs of behaviour is of great importance, as interventions based on key determinants are more effective in changing behaviour (Baranowski et al., 1998). Currently, physical activity intervention research is most often concerned with the overall change in behaviour or behaviour related variables (e.g., MI, body weight, overall health). This is important in the context of reducing the impact of the rising rates of overweight and obesity and the related health consequences. It is equally important, though, to develop a better understanding of social-cognitive influences and how behaviour is changed. It is also critical to investigate long-term changes, as well as, what constructs, when specifically targeted, would be most beneficial for the facilitation of short-term healthy behaviour changes. For example, in this study, the salient Social Cognitive Theory constructs related to physical activity behaviours were social support from family and friends, outcome expectations about participating in activity, and goals to be active. Limitations of the current study include the lack of a knowledge construct. In addition, although the sample size is adequate, the schools were selected as part of a convenience sample.

In order to better understand physical activity and other health behaviours using sociocognitive theories, it may be necessary to combine theoretical models (e.g., Hagger, 2009) and/or include other ecological components in studies (e.g., individual, interpersonal, community, organization, and policy factors; Sallis & Owen, 2002). For example, Hagger and Chatzisarantis (2009) combined the Theory of Planned Behaviour (TPB) and Self-Determination theories via meta-analyses in order to provide support for a sequence of self-determined motivation predicting intentions and behaviours from the TPB. Another example is Card's study (2011) combining Social Cognitive Theory and interdependence theories in order to better explain children's relationship perspectives of aggression. While the current study supported the ability of four Social Cognitive Theory constructs (i.e., self-efficacy, outcome expectations, social support, goals) to predict children's physical activity behaviours, only a small amount of behaviour was accounted for by the model (Bandura, 2004), thus, it is critical for researchers to consider integrated and comprehensive models to explain and change physical activity and health behaviours.

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