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Parental influences on 7–9 year olds' physical activity: A conceptual model

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Abstract

Objective—Models characterizing parental influence on child and adolescent physical activity (PA) over time are limited. Preschool and Adolescent Models (PM and AM) of PA are available leaving the need to focus on elementary-aged children. We tested current models (PM and AM) with a sample of 7–9 year-olds, and then developed a model appropriate to this specific target population.

Methods—Parent–child dyads completed questionnaires in 2010–2011. All models were assessed using path analysis and model fit indices.

Results—For adequate power, 90 families were needed, with 174 dyads participating. PM and AM exhibited poor fit when applied to the study population. A gender-specific model was developed and demonstrated acceptable fit. To develop an acceptable model for this population, constructs from both the PM (i.e. parental perception of child competency) and AM (i.e., child-reported self-efficacy) were used. For boys, self-efficacy was a strong predictor of PA, which was influenced by various parental variables. For girls, parental PA demonstrated the greatest strength of association with child PA.

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Conflict of interest

The authors declare that there are no conflicts of interests.

Conclusion—This new model can be used to promote PA and guide future research/interventions. Future studies, particularly longitudinal designs, are needed to confirm the utility of this model as a bridge between currently available models.

Keywords

Physical activity; Child health; Conceptual model; Parental influence; Self-efficacy; Role modeling

Introduction

Parents' physical activity (PA) related perceptions influence their children's PA (Corder et al., 2010; Rhee et al., 2005). There is a need to better understand how parental influences relate to each other and to child PA (C-PA), while also considering various child age groups (Katzmarzyk et al., 2008).

Researchers consistently call for theoretically-sound frameworks to guide PA promotion (Katzmarzyk et al., 2008; O'Connor et al., 2009; Salmon et al., 2009) focusing on a population's most influential characteristics (Brown et al., 2009). Current models describe parental influences on preschooler PA (Loprinzi and Trost, 2010) and adolescent PA (Trost et al., 2003). These models are guided by Eccle's Expectancy Value Theory (Eccles et al., 1983) which explains that an individual's behavior is regulated by outcome expectations and the values placed on the outcomes. The expectations and values parents place on C-PA regulate their influences on C-PA. We lack a theoretically-based model explaining parental influences on young, elementary-aged children's PA.

Our goal was to provide an age-appropriate model depicting parental influences on PA of 7–9 year olds. Our central hypothesis was that existing models' constructs would appropriately explain parental influences of C-PA. The second hypothesis was that these constructs would indicate different levels of parental influence on C-PA compared to existing models. Our findings along with the PM and AM, would offer insight into the types and levels of parental influence at various ages of children.

Methods

Kindergarten (2007–2008) or second-grade (2009–2010 & 2010–2011) parent–child dyads from a larger school-based screening program were recruited during the 2010–2011 school year. For reliability analyses, a subsample of participants completed a second survey approximately one week after returning the initial survey.

Table 1 details the study constructs and data collection tools. When possible, we used the same data collection tools as the PM and AM studies. Because the child-report measures had not previously been used in our population, we conducted cognitive testing (Leary et al., 2012) to ensure appropriateness for this age-group. Self-reported C-PA was validated with a subsample of participants using Omron-HJ-112 pedometers, which have been used in C-PA research (Nakae et al., 2008). The pedometers were included in the second survey data collection.

Descriptive statistics and tests of normality were conducted. T-tests assessed differences between respondents and non-respondents. The C-PA variable was transformed into a 1–10 scale to make variances comparable with other study variables. Power analyses indicated that 90 dyads were necessary for model testing. M-Plus was used to test model fit. Other analyses were conducted using SPSS 18.0.

Results

Surveys were returned by 174 parent–child dyads. Response rates varied from 4.1% to 27.9%, based on when families participated in the original school-based screening. Respondents and non-respondents did not significantly differ on most variables available at screening: child gender, child race, and child BMI percentile during screening. Respondents included significantly younger children than non-respondents (8.77 years, $SD=0.51$, 8.95 years, $SD=0.01$, $p<0.05$). Table 2 provides additional participant data.

Neither the PM nor the AM adequately fit our dataset (Table 3). Despite poor fit for the currently available models using our dataset, correlations between constructs suggested influences on C-PA (Table 4), but in different ways from current models. Having no strong representation for this age-group in the literature, a new Young Child Model (YCM) was investigated using constructs from the original models.

Because of little variance in child age (variance=0.26) and the non-significant correlation between child age and C-PA ($p=0.73$), child age was removed from the model. Competency (PM) and self-efficacy (AM) were included in the YCM and served as a bridge between the current models. Because gender is consistently reported as a possible moderator in C-PA (Salmon and Timperio, 2007; te Velde et al., 2007), we included child gender as a moderator in the YCM.

Table 3 provides fit indices and Fig. 1 depicts the gender-specific strengths of relationships for the YCM. The YCM explained 6.7% of PA variance among boys. Parent PA, Importance, Enjoyment, and Competency accounted for 29.3% of Support variance. Competency and Support accounted for 31.9% of Self-efficacy variance. The main construct of influence on boy's PA was Self-efficacy ($\beta=0.26$, $p<0.001$).

The YCM explained 17% of PA variance among girls. Parent PA, Importance, Enjoyment, and Competency accounted for 22.5% of Support variance. Parent PA, Competency and Support accounted for 15.6% of Self-efficacy variance. The main construct of influence on girl's PA was Parent PA ($\beta=0.15$, $p<0.001$).

Discussion

Parental influence on preschool (Loprinzi and Trost, 2010) and adolescent (Trost et al., 2003) PA have been reported, but no studies, to date, include young, elementary-aged children. Our study found that currently available models were not appropriate for our population; subsequently, a new gender-specific model was developed depicting parental influences on young child PA. These three models illustrate distinct differences in parental influence on C-PA. Parental influences on C-PA were gender-specific in the YCM whereas

Support was most influential in the AM (Trost et al., 2003) and Competency in the PM (Loprinzi and Trost, 2010).

The importance of child gender is evident in the YCM where boys and girls differed in their most influential construct. The PM & AM studies included gender in their models but not as a moderator. Reassessing these models with gender as a moderator may provide new insight into influences on preschooler and adolescent PA.

While we provided evidence of validity for self-reported C-PA data using pedometers, objectively-measured PA may provide a more accurate representation of the association between parental influences and C-PA. Given that self-reported methodology is prone to more random measurement error, thus attenuating associations toward the null; our findings may underestimate the effects of parental influences on child activity. Several children could not participate in the pedometer portion of this study because they could not wear the pedometer at school or while participating in organized sports. This may explain the modest correlation between the pedometers and self-report PA. This also underscores the need for data collection tools for children who cannot wear electronic devices.

While the required sample size of 90 dyads was exceeded ($n=174$), the overall response rate was very low (8.5%). Typically, this population has a response rate of 20–30% when surveys are completed immediately after screening program participation. Our response rate varied from 4.1% for families who participated in the screening 3 years ago to 27.9% for the current screening families. This stresses surveying participants soon after their initial interest in research participation. Nevertheless, there was little difference in available demographic characteristics of respondents and non-respondents, suggesting limited selection bias.

Participants were from predominately rural, Appalachian areas. Almost half (47.7%) of participating adults were college graduates compared with 17.3% in the state (US Census Bureau, 2013) but similar to the PM (60.9%; Loprinzi and Trost, 2010) and AM (53.0%; Trost et al., 2003) families. Most participants were white. These characteristics may limit generalizing results to other populations.

This study also has several strengths. Health professionals need accurate, age-appropriate information to assist parents with children of various ages to have a healthful impact on each child's PA. The resulting YCM fills a gap in the literature and suggests that parental influences on 7–9 year-old PA differ from that of other populations. The YCM can be used to better understand how parent–child relationships evolve as children progress from preschool to adolescence.

Based on the present study's findings, interventionists may want to focus on increasing child self-efficacy for overcoming PA barriers, increasing parental support of C-PA, promoting parent PA role modeling, and improving parent PA attitudes. Child self-efficacy appears to be important regardless of parental influences, demonstrated by the strong direct link between Self-efficacy and C-PA in both the YCM-Boys and AM. Competency had a significant direct link with preschooler PA and a significant indirect link in the YCM.

Parental support was an important direct influence in the PM and AM and should be considered. While there was a not direct link between parental support and C-PA in the YCM, one was found between parental support and child self-efficacy. Interventionists can promote higher child self-efficacy by assisting parents in improving PA support offered to their child, which may in turn, increase actual C-PA.

Parent PA had an indirect link through parental support in the PM and AM. In the YCM, the same indirect link was present, but for girls, there was also a direct link between girls' PA and parent PA. The majority of parent respondents were mothers; girls may have identified with their mother more so than boys. Additional research is necessary to assess parent-child gender relationships and C-PA. Meanwhile, reminding parents that their PA may serve as a model for their children may prompt parents to be more active, thus promoting parent PA and C-PA.

PA's effect on child health is critical. Behaviors cemented into habit during childhood are likely to continue into adulthood (Telama et al., 2005). Understanding mechanisms that promote PA is important to fostering a health promoting lifestyle. This study supports the importance of parental influences on C-PA while underscoring age-dependent differences to be considered when promoting C-PA.

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Fig. 1.
Young Child Model with child gender as a moderator.

Table 1

Constructs used to assess parental influences on child physical activity.

Variable	Model ^a	Report method	YC data collection		Validity
			Reliability	Validity	
Parent PA	AM PM YCM	Parent self-report International Physical Activity Questionnaire (IPAQ)-Short Form (Craig et al., 2003) and IPAQ guidelines, (Patterson, 2011)	Test-retest ($r(46)=0.45$, $p<0.01$)		
Parent PA Enjoyment	AM PM YCM	"How much do you enjoy PA or exercise" using a 5-point scale with 1 indicating "not enjoyable" and 5 indicating "very enjoyable"	Test-retest ($r(46)=0.67$, $p<0.001$)		($r(127)=0.78$, $p<0.001$) Correlated with the "PA Enjoyment Scale" (Castro et al., 2007)
Parent PA Importance	AM PM YCM	"How important is it to you that your child is good at sports and physical activities" using a 5-point scale with 1 indicating "not at all important" and 5 indicating "very important"	Test-retest ($r(46)=0.37$, $p<0.05$)		($r(123)=0.39$, $p<0.001$) Correlated with PA Importance Scale (Anderson et al., 2009)
Parent PA Support	AM PM YCM	Six-item scale. How often parents support child PA through praise, transportation, watching, participation, discussing PA importance, and encouraging child to be physically active. A 5-point Likert scale with 1 indicating "never", 5 indicating "daily".	Cronbach's alpha: 0.770 Test-retest ($r(49)=0.72$, $p<0.001$)		
Child PA Competency	PM YCM	Adapted from the Child PA Competency Scale (Loprinzi and Trost, 2010). A 5-point Likert scale with 1 indicating "disagreed a lot" and 5 indicating "agreed a lot"	Cronbach's alpha: 0.99 Test-retest ($r(49)=0.83$, $p<0.001$)		
Child age	AM PM YCM	Variable not used in the current study's final model			
Child gender	AM PM YCM	Variable used as a moderator in the current study's final model			
Child PA Self-efficacy	AM YCM	Adapted from other child PA self-efficacy scales (Bartholomew et al., 2006; Dziewaltowski et al., 2010; Trost et al., 2003). Children were asked "How sure are you that you can do the following activities?". Five-point Likert scale choices ranged from "I am sure I cannot" to "I am sure I can".	Cronbach's alpha: 0.77 Test-retest ($r(49)=0.73$, $p<0.001$)		
Child PA	AM YCM PM	Log included 38 different activities (with space to enter additional activities). Log was adapted from Trost et al. (2003). Children entered number of days and minutes they took part in each activity. Activities were converted to METs based on the 2011 Compendium of Physical Activities (Ainsworth et al., 2011). A subsample of children wore a pedometer for 2–7 days [days of data required based on research by Schreiber et al. (2006)] to provide validity analysis data.	Test-retest ($r(37)=0.46$, $p<0.01$)		Correlation with pedometer data ($r(38)=0.39$, $p<0.05$) Correlation between parent and child report of child PA ($r(170)=0.95$, $p<0.001$)

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AM=Adolescent Model (Trost et al., 2003), PM=Preschool Model (Loprinzi and Trost, 2010), and YCM=Young Child Model.

Table 2
Descriptive statistics for study variables (percentages may not total 100% due to missing data).

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Child gender (female)	86 (49.4%)						
Child age	174	7.00	9.88	8.75	0.5	-0.59	0.40
Child race (white)	144 (82.8%)						
Parent gender (female)	145 (83.3%)						
Parent age	144	21.00	62.00	36.70	6.0	0.58	1.47
Parent PA	164	0.00	2442.86	502.04	537.7	1.78	2.84
P-PA Enjoyment	168	1.00	5.00	3.71	1.1	-0.57	-0.39
P-PA Importance	163	1.00	5.00	4.21	0.9	-1.14	1.21
C-PA Competency	171	1.00	5.00	4.23	0.7	-1.42	3.27
P-PA Support	171	1.00	5.00	3.65	0.7	-0.53	0.44
C-PA Self-efficacy	167	1.80	5.00	4.10	0.6	-0.83	1.03
Child PA	172	21	336	130.85	63.5	0.70	0.35
Child PA	170	21	336	131.32	60.6	0.59	0.33

Table 3

Model characteristics when applied to the study population.

	χ^2	p-value	χ^2/df	CFI	RMSEA (90% CI)
Adolescent Model using YC dataset	76.255	0.000	5.45	0.566	0.169 (0.133–0.208)
Preschool Model using YC dataset	58.678	0.000	5.87	0.571	0.177 (0.135–0.222)
Young Child Model-by gender	11.353	0.727	0.76	1.000	0.000 (0.000–0.080)
Chi-square contributions by gender					
Females	5.784				
Males	5.569				

Table 4

Correlation matrix for YC-female model variables.

	Child PA	Parent PA	P-PA Enjoyment	P-PA Importance	Competency	P-PA Support
Females						
Parent PA	0.39 ^a					
P-PA	0.05	0.08				
Enjoyment						
P-PA	0.06	0.11	0.10			
Importance						
Competency	0.09	0.14	0.25 ^b	0.24 ^b		
P-PA	0.14	0.26 ^b	0.22	0.39 ^a	0.21	
Support						
C-PA	0.18	0.10	0.12	0.16	0.30 ^a	0.32 ^a
Self-efficacy						
Males						
Parent PA	0.04					
P-PA	0.05	0.24 ^b				
Enjoyment						
P-PA	0.07	0.04	0.33 ^a			
Importance						
Competency	0.14	0.22	0.32 ^a	0.46 ^a		
P-PA	0.10	0.26 ^b	0.30 ^a	0.37 ^a	0.48 ^a	
Support						
C-PA	0.26 ^b	0.15	0.20	0.28 ^b	0.54 ^a	0.40 ^a
Self-efficacy						

^aCorrelation is significant at the 0.01 level (2-tailed).

^bCorrelation is significant at the 0.05 level (2-tailed).