Research Article

Predisposing, Reinforcing and Enabling Predictors of Middle School Children's After-school Physical Activity Participation

Kristi M. King, Roberta J. Ogletree, Joyce V. Fetro, Stephen L. Brown, and Julie A. Partridge

ABSTRACT

Background: *Children's participation in after-school physical activity can attenuate the overweight and obesity rates among rural, low socioeconomic status (SES) children. Children's individual determination, as well as social and environmental factors, can influence their behaviors.* ***Purpose:*** *The purposes of this study were to determine if a difference existed in after-school physical activity participation among children from different socioeconomic strata and to identify predisposing, reinforcing, and enabling predictors of after-school physical activity.* ***Methods:*** *A cross-sectional, descriptive research design using surveys was used with rural, middle school children.* ***Results:*** *Low SES children were more active than high SES children. Physical activity self-efficacy, attraction to physical activity, and access to equipment were statistically significant in predicting children's after-school physical activity level.* ***Discussion:*** *Interventions enhancing self-efficacy and providing enjoyable options with adequate equipment can foster children's after-school physical activity behavior. Further research however should examine reasons (e.g., farming) why low SES children reported themselves to be more active than not-low SES children; these results are contrary to results from other studies.* ***Translation to Health Education Practice:*** *Increasing overweight and obesity rates should prompt practitioners to consider implementing both physical activity and nutrition interventions specific to rural children.*

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BACKGROUND

The overweight and obesity rates among American adults and children are increasing - poor nutrition and physical inactivity are key culprits.[1] It is well documented that physical activity attenuates the overweight and obesity crises,[2-6] and has been deemed as a leading health indicator for improving our nation's health.[7] Because childhood is an important time when health behaviors are learned and adopted,[8] it is crucial that health educators promote health enhancing behaviors in this developmental stage.[9] Whereas most experts agree that children should participate in 60 minutes of daily physical activity for health benefits, the majority of children are sedentary.[10-12] Children become less active as they grow older.[13, 14] Obese young people are more likely than children of normal weight to become overweight or obese adults, and therefore more at risk for associated adult health problems, including heart disease,

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type 2 diabetes, stroke, several types of cancer and psychological disorders.[15]

Research shows that, among adults, the prevalence of sufficient physical activity is lower in low socioeconomic status (SES) populations;[16, 17] however, in children, the findings are less conclusive.[18-20] Whereas a child's individual determination is one predictor of behavior,[8] the influence of his or her friends or family as well as his or her environment may influence behavior as well.[21] For example, a child may want to play outside, but if his parents will not allow him to go outside or if he does not have access to a safe outdoor environment, then playing outdoors may not be possible.

By using the PRECEDE-PROCEED[22, 23] educational/ecological framework to assess predisposing (e.g., knowledge, values), reinforcing (e.g., rewards and feedback from others), and enabling (e.g., skills or resources) predictors of children's after-school physical activity, health educators can identify significant variables that increase the likelihood that behavioral and environmental changes will occur,[24, 25] then tailor interventions to best address audience needs.[26] Previous research has indicated that predisposing, reinforcing, and enabling factors predicted physical activity participation with elementary, middle and high school aged children.[26, 27]

PURPOSE

Because there is a lack of research addressing the role of socioeconomic status in children's physical activity participation, the purpose of this study was to determine whether family socioeconomic status influenced child physical activity. In addition, because the majority of a child's physical activity accumulation occurs after school,[28, 29] the secondary purpose was to understand which factors influenced children's discretionary physical activity patterns.

METHODS

A cross-sectional, descriptive research design was used. Human Subjects approval was granted and approvals from the pilot study and research study middle school principals were obtained prior to implementing the study. Surveys were administered to convenience samples of children who had written parent/guardian consent and who were present in school on the data collection days.

The middle school in which the study was conducted was in a rural community where 98.0% of the students were white and one-half (50.2%) of the total number of students ($N = 319$) at were enrolled in the free or reduced-price lunch program. The county's children's poverty rate was 29.0%.[30] The middle school guidance counselor recommended that low and not-low socioeconomic status among children be measured by asking children to respond to the survey item "Do you receive free or reduced-price lunch?" with response choices "yes" or "no." She explained that all children knew their status since they used "punch card" options of either "free or reduced price" or "regular" daily during lunch.

Two weeks prior to the study, the researcher gave teachers an informed consent form for each student to return with a parent's signature. Of the 635 forms distributed, 176 were returned with a parent signature (174 yes, 2 no) for a 25.3% response rate. One-hundred fifty-eight students completed the survey (90.8% participation rate for those with permission). An almost even representation of females ($N = 81$, 51.3%) and males ($N = 76$, 48.1%) participated in the study (one child did not respond to the question), and 62 children (39.2%) received free/reduced-price lunch (low-SES) while 93 children (58.9%) did not (not-low SES) (three children did not respond to the question). On the two days of data collection (one week apart), the researcher and two faculty members from a nearby university were present to assist teachers with survey administration. Only students with permission were invited to participate. Teachers delivered the completed surveys to the researchers in sealed envelopes at the end-of-the-day study hall.

The independent variables included 14 predisposing, reinforcing and enabling factors. The three predisposing factors addressed were physical activity self-efficacy, attraction to physical activity and physical activity competence. The three reinforcing factors examined were parental role modeling, parental influence and peer influence. The eight enabling factors examined were: the number of days children walked to school per week; number of days children walked home after school per week; access to playgrounds, parks, or gyms; neighborhood safety; number of physical activities or sports teams children participated in after school; access to physical activity equipment; average after-school television viewing time; and average after-school computer or video gaming time. The dependent variable was minutes per day children spent engaged in physical activity after school. Socioeconomic differences were also examined to determine their influence in predicting children's physical activity level. Table 1 provides a summary of the variables measured.

Instrumentation

A survey booklet was developed using a compilation of items selected from pre-established surveys. A short description and rationale for selection and measurement of the variables follows.

Physical Activity Self-efficacy

A modification of the physical activity self-efficacy scale, derived from Bandura's Social Cognitive Theory[31] and refined by Saunders, Pate, Felton, et al.[32] for use with children, was used for this study. The 17-item, 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree) measured three self-efficacy constructs: seeking social support, confidence in overcoming barriers to physical activity and seeking positive alternatives. The average score from the 17 items was used to reflect a child's physical activity self-efficacy.

Attraction to Physical Activity, Physical Activity Competence, Parental Influence, Parental Role Modeling and Peer Influence

A modified version of the Children's Physical Activity Correlates (CPAC)[26] Scale was used to assess attraction to physical activity (5 items), physical activity competence (5 items), parental role modeling (4 items),

and parental influence (4 items). The self-esteem items of the original CPAC Scale were replaced by a 17-item self-efficacy scale from Saunders, Pate, Felton, et al.[32] and four peer influence items were modeled after the CPAC's attraction to physical activity item. A 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree) was used. The average score for each factor was determined by adding the numerical score assigned for each response and dividing it by the total number of items for that variable. To ensure that children were paying attention to each item individually, some items were reverse coded, that is, written in a negative manner so that a child would not circle the same response for each item.

Television and Computer/Video Game Use

The items that measured television and computer/gaming time were selected from the Middle School Youth Risk Behavior Surveillance Survey (MSYRBS).[33-35] The MSYRBS items were modified to reflect after-school activity. Each item began with "On an average day after school..." to ensure children were specifying after-school activity as opposed to in-school or weekend activity.

Current Physical Activities or Sports Team Participation

A modification of the MSYRBS[35] item pertaining to sport team involvement was developed. Children were asked to "Circle the letter beside ALL of the physical activities or sports you currently participate in after school. (Include any activities run by your school or community groups.)" Students were also allowed an option to write in "other" physical activities. Popular response options were included such as dance or cheerleading, basketball, football and weightlifting for selection because of their popularity among middle school students in the geographic area where the study was conducted.[36] The total number of physical activities or sports that children participated in provided one total score for current physical activities or sports team participation.

Access to Physical Activity Equipment, Access to Playgrounds, Parks, or Gyms, and Safety of Neighborhood

Four-point strongly agree to strongly disagree Likert-type scales were constructed with statements that measured children's access to physical activity equipment; access to playgrounds, parks, or gyms; and neighborhood safety. Children were also asked to respond to how many days they walked to school or home from school per week. Response options were "I do not walk to school (or home or somewhere else after school) on an average week," "1 day per week," "2 days per week," "3 days per week," "4 days per week," and "5 days per week."

After-school Physical Activity

To quantify after-school physical activity behavior, a MSYRBS[35] physical activity question was modified resulting in the question "During an average school week, how many hours and minutes are you physically active per day after school? (Add up all the time you spend in any kind of physical activity that increases your heart rate and makes you breathe hard some of the time.)" Responses were "0–29 minutes," "30 minutes (½ hour)–59 minutes," "60 minutes (1 hour)–89 minutes," "90 minutes (1½ hours)–119 minutes," and 120 minutes (2 hours) or more" for each day of the school week. The question was designed to assess frequency (number of days per week), intensity (moderate to vigorous intensity) and duration (minutes) of after-school physical activity.

Instrument Validity and Reliability

To determine the face and content validity of the instrument items, a panel of three experts of children's physical activity and psychosocial correlates reviewed the survey to ensure that the items were designed to measure the constructs for which they were intended. Instrument reliability and data collection efficiency were determined from a pilot study. Researchers selected two classes (N = 26 sixth grade students and N = 21 seventh grade students) from a neighboring county middle school to conduct the pilot study due to its similar demographic make-up of the community to the primary data collection school.

The internal consistency reliability results of independent variables are presented in Table 2. Physical activity self-efficacy (α = .91), attraction to physical activity (α = .70), physical activity competence (α = .79), parental role modeling (α = .79), and parental influence (α = .89) items showed acceptable alpha coefficients. Peer influence showed low internal consistency (α = .34). It was not deleted from the instrument because previous research with peer influence[26,37,38] has shown it to be predictive of children's participation in physical activity and sport.

To determine the temporal stability of the survey, test-retest reliability correlations of response patterns were conducted with each of the variables from Day 1 and Day 2 of data collection by utilizing Pearson correlations. Each child's survey responses from Day 1 were compared to his/her responses on Day 2. Strong positive correlations that were significant ($P < 0.05$) were found for all independent variables from Day 1 to Day 2.

The dependent variable of physical activity minutes was modified as a result of the findings from the pilot study. The open-ended MSYRBS[35] question requesting children to respond to the average number of hours and minutes they spend being physically active after school each day ranged from 0 minutes to 480 minutes per day during the pilot study. Based on the recommendations from the panel of experts, the response option was redesigned into a forced-response option while leaving the question stem intact. Revised physical activity range options were "0–29 minutes", "30–59 minutes", "60–89 minutes", "90–119 minutes," and "2 hours or more" per day.

Data Analysis

Data were imported into Statistical Package for the Social Sciences (SPSS®) version 15.0 (SPSS, Inc.) for analyses. Blank items were coded as "." to represent missing data. Children's responses were high for the survey with less than 5% missing data on all items, therefore listwise deletion method was employed to analyze complete cases. A significance value of α = .05 was set for analyses in this study. Descriptive statistics were calculated for all independent variables (Table 3).

A Somers' d test was employed for this

study because it provides an asymmetric measure of association for two ordinal variables (5 levels for physical activity minutes and 2 levels for socioeconomic status). A 5 x 2 cross tabulation of cell counts was examined to determine if differences existed between children's after-school physical activity level and socioeconomic status. The items for analysis were demographic item response "yes" to receiving free or reduced-price lunch and average daily level of minutes spent in physical activity.

To determine significant predictors of physical activity level, the first step was to conduct bivariate correlation analyses with the 14 independent variables (average score of self-efficacy items; average score of attraction items; average score of perceived competence items; average score of parental role model items; average score of parental influence items; average score of peer influence items; average number of days per week a child walked to school; average number of days per week a child walked home from school; access to playgrounds, parks, or gyms item; average score of neighborhood safety items; number of physical activity or sport teams; score for access to physical activity equipment item; average number of hours of TV per day; and average number of hours of video/computer per day). Then, only the nine significant predictors (average score of self-efficacy items, average score of attraction items, average score of competence items, average score of parental role model items, average score of parental influence items, average score of peer influence items, average score of neighborhood safety items, number of physical activity or sport teams; score for access to physical activity equipment item, and average number of hours of video/computer per day) were regressed against level of minutes spent in physical activity after school per day using ordinal logistic regression.

RESULTS

The most frequently reported level of average daily minutes that children selected was "60 minutes (1 hour)–89 minutes," (N = 50, 31.6%). The second most frequently

Table 1. Summary of Selected Survey Items

Variables
Free or reduced-price lunch recipient (1 item)
Average level of minutes spent in physical activity after school per day (5 items)
Predisposing factors
Average score of self-efficacy items (17 items)
Average score of attraction items (5 items)
Average score of perceived competence items (5 items)
Reinforcing factors
Average score of parental role model items (4 items)
Average score of parental influence items (4 items)
Average score of peer influence items (4 items)
Enabling factors
Number of days per week a child walked to school (1 item)
Number of days per week a child walked home from school (1 item)
Score for access to playgrounds, parks, or gyms item (1 item)
Average score of neighborhood safety items (2 items)
Number of physical activity or sport teams (1 item)
Score for access to physical activity equipment item (1 item)
Average number of hours of TV per day (1 item)
Average number of hours of video/computer per day (1 item)

Table 2. Internal Consistency Reliability of Selected Independent Variables

Subscale	Number of participants	Cronbach's alpha
Self-efficacy (17 items)	47	.91
Attraction (5 items)	47	.70
Competence (5 items)	47	.70
Parental role modeling (4 items)	47	.79
Parental influence (4 items)	48	.89
Peer influence (4 items)	47	.34
Perceived neighborhood safety (2 items)	46	.62

Table 3. Summary of Predisposing, Reinforcing, and Enabling Factors (*N* = 158)

Independent Variables	*M*	*SD*
Predisposing factors		
Physical activity self-efficacy[a]	3.34	.45
Attraction to physical activity[a]	3.32	.53
Physical activity competence[a]	3.07	.65
Reinforcing factors		
Parental Role Modeling[a]	2.76	.63
Parental Influence[a]	3.36	.56
Peer Influence[a]	3.13	.59
Enabling Factors		
Average number of days walk to school per week[b]	.42 (>1 day)	1.30
Average number of days walk home from school per week[b]	1.11 (1-2 days)	1.89
Access to playgrounds, parks, or gyms[a]	2.47	1.09
Neighborhood safety[a]	3.53	.58
Number of physical activities or teams	1.45	1.45
Access to equipment[a]	3.68	.56
Average minutes of TV per day[c]	3.13 (2-3 hours)	1.54
Average minutes of computer/video gaming per day[c]	2.31 (1-2 hours)	1.77

Note. *N* = sample number, *M* = mean score, *SD* = Standard Deviation
[a]Strongly Disagree = 1; Disagree = 2; Agree = 3; Strongly Agree = 4.
[b]I do not walk to (or home or somewhere else after) school on an average week = 0, 1 day per week = 1, 2 days per week = 2, 3 days per week = 3, 4 days per week = 4, 5 days per week = 5.
[c]I do not watch TV (or play video or computer games) on an average school day = 0, Less than 1 hour per day = 1, 1 hour per day = 2, 2 hours per day = 3, 3 hours per day = 4, 4 hours per day = 5, 5 or more hours per day = 6.

reported average number of minutes that the children selected was "30 minutes (½ hour) – 59 minutes," (*N* = 44, 27.8%). The Somers' d test results indicated that there was a significant difference in after-school physical activity level between children in low SES and not-low SES ($P = 0.035$). Low SES children were more active than high SES children. Figure 1 depicts the percent of children represented in each physical activity level grouped by low SES and not-low SES.

Spearman correlation coefficients were calculated to determine the relationship among demographic variables and physical activity level. There were statistically significant relationships between physical activity level and the demographic variables age [$\rho(155) = -.200$, $P < 0.05$], grade [$(\rho\ 155) = -.299$, $P < 0.01$], and socioeconomic status [$\rho(153) = -.169$, $P < 0.05$]. Each of the correlation coefficients were negative, meaning that there was an inverse relationship between the two variables. Specifically, as age increased, physical activity level decreased; as grade increased, physical activity level decreased; and as SES moved from low to not-low (increased), physical activity level decreased. There was no statistically significant relationship between gender and physical activity level ($\rho(155) = -.016$, $P = 0.844$).

The ordinal logistic regression test indicated that three variables were significant in predicting children's after-school physical activity level (Table 4). Two predisposing variables, physical activity self-efficacy ($P = 0.03$) and attraction to physical activity ($P = 0.01$), were statistically significant predictors of middle school children's after-school physical activity level. Children who scored one unit higher on the physical activity self-efficacy scale were 3.4 times more likely to be physically active than a child with a lower physical activity self-efficacy score given that all of the other variables in the model were held constant. Children who were attracted to physical activities, games, sports and exercise were 3.48 times more likely to participate in after-school physical activity than children less attracted to physical activities given that all of the other variables in the model were held constant.

The third predisposing variable, physical activity competence, was not statistically significant in predicting middle school children's after-school physical activity ($P = 0.19$). None of the three reinforcing variables, parental role modeling, parental influence, or peer influence, was statistically significant in predicting children's physical activity (Table 4).

One of the eight enabling variables measured, access to equipment, reached statistical significance in predicting middle school children's after-school physical activity level ($P = 0.01$). Children who scored higher on the scale assessing access to supplies and pieces of sports equipment like balls, bicycles, and skates to use for physical activity at home were 2.46 times more likely to be physically active than children who scored lower on the access to physical activity equipment scale given that all of the other variables in the model were held constant. None of the other enabling variables (walking to school, walking home from school, access to play spaces, neighborhood safety, number of sports teams, hours of TV time and hours of computer time) were statistically significant in predicting children's physical activity level (Table 4).

DISCUSSION

Socioeconomic Status and Physical Activity

It is encouraging to find that within this sample, almost two-thirds of the children reported being physically active at least 60 minutes or more per day. The children also reported having sufficient equipment and motivation to engage in physical activity. Research studies indicate, however, that once children reach high school and adulthood, their physical activity levels plummet.[39, 40] It is important for health educators to continually work with communities to provide physical activity opportunities for children as they become older.

One potential concern should be considered however, the children in this study reported themselves to be more active than those reported in many nationally surveyed samples.[10] Children from low socioeconomic status families reported themselves to be more active than children who were not from low socioeconomic families. This conclusion is contrary to research with adults which concludes that low socioeconomic status adults are less active than not-low socioeconomic adults.[16] Social desirability may have been a factor as well.

Because there was a statistically significant difference found between children of low SES and not-low SES physical activity patterns, health educators can probe further to investigate why the difference was contrary to much literature supporting that low-SES predicts physical inactivity.[41, 42] Studies indicated that children from low SES areas often times do not have equal access to educational and participation opportunities as their not-low SES peers.[16, 40] Perhaps the children in this study who were from lower socioeconomic families had less access to expensive sedentary activities such as computers or video games. Another possibility may be that since the study took place in a rural community, it is possible that some of the children may have been involved in working on their families' farms. Future research should strive to determine reasons why a difference in physical activity level was found between the two SES groups.

Specific to the rural geographic location in which this research study was conducted, there is concern among researchers that rural residency is a risk factor for children's health. Lutfiyya et al.[41] utilized the National Survey of Children's Health data, a national sample of 5- to 18-year-old children ($N = 46,396$), and concluded that children younger than five years old who lived in rural areas were more likely to be overweight or obese, have no health insurance, spend more than 3 hours a day playing computer/video games, and watch TV for more than 3 hours a day. As a result, the authors concluded that living in a rural setting was a significant predictor of obesity. Interestingly, the children in this study indicated high physical activity levels, contrary to other rural and low socioeconomic findings. Further investigation into the potential health risks associated with living in a rural area is necessary. Developing qualitative studies to determine correlates of rural, poor children's physical may shed light on the contrary findings in this study.

Enabling Factors

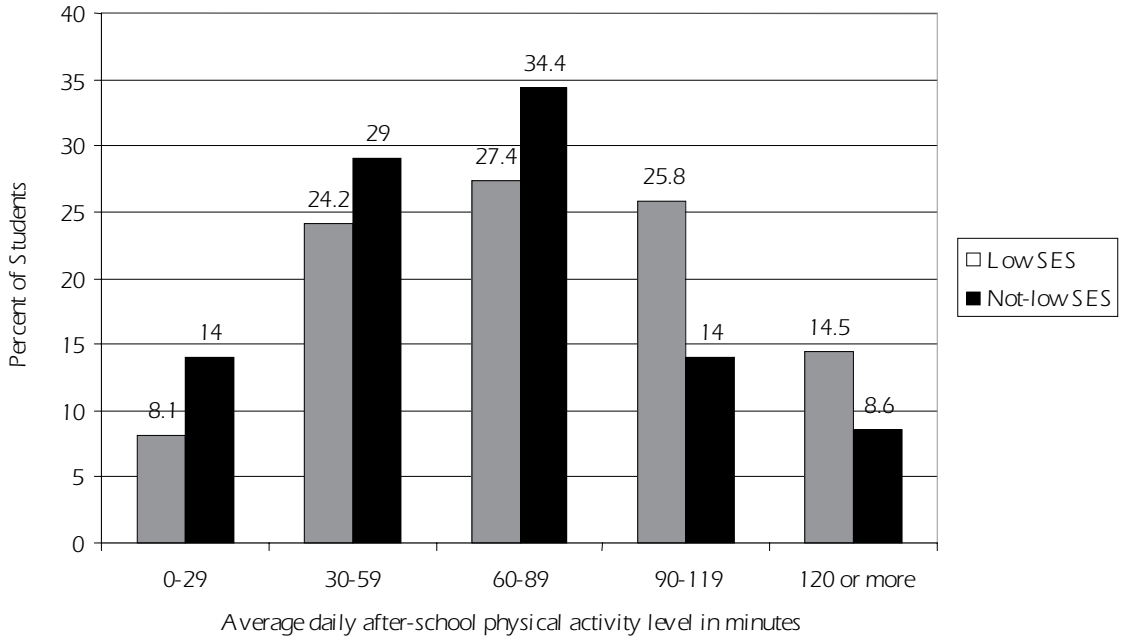
Access to Play Spaces, Activities and Equipment

Children who felt that they had toys, equipment, or supplies, such as bicycles, skates, balls, or jump ropes at home, were almost 2 ½ times more likely to accumulate more after-school physical activity than children who didn't feel that they had the equipment. A child's socioeconomic status may influence whether he or she has access to toys, equipment, and supplies at home. Interestingly, socioeconomic status impacted children's physically activity level in the opposite way that it has traditionally been impacted. Low SES children were more active than not-low SES children. If a parent cannot afford to purchase physical activity toys or sports equipment, then the child will not have access to these activity promoting items; thus negatively impacting physical activity participation. Although, in this research study, number of sports did not result in statistical significance in predicting middle school children's after-school physical activity level, access to after-school physical activity opportunities has historically been a strong correlate of children's physical activity accumulation in the United States. *Healthy People 2010* recognized the importance of after-school opportunities for children and listed it as an objective.[40] Further investigation into socioeconomic status and physical activity opportunities among middle school children warrants much attention.

Screen Time is Sedentary Time

"Screen time," common terminology for television, computer and video use, revealed negative relationships with physical activity time. In the current study, television viewing time and computer/video gaming time did not reach statistical significance in predicting children's after-school physical activity level ($P = 0.72$ and $P = 0.18$, respectively). Children spent an average of 3 hours and 44 minutes of sedentary time in front of a screen per day. Two hours and 13 minutes were dedicated to watching television and

Figure 1. Percent of Children at 5 Physical Activity Level Grouped by Low SES and Not-low SES



one hour and 31 minutes was dedicated to computer use and/or video gaming. The American Academy of Pediatrics and National Association for Sport and Physical Education recommended that children spend less than 2 hours per day engaged in sedentary activity, and specifically, less than 2 hours per day watching television and/or engaging in computer/video gaming.[12, 42]

Since children in this study typically arrived home from school around 3:30 p.m. and some studies indicate that children go to bed around 10:00 p.m.;[43, 44] over one-half of their after-school time was spent at home was in front of a screen. The time that children have after school is the primary time when they can accumulate the majority of their physical activity.[29] Some researchers contest that the time a child spends in front of a screen can: (1) compete with time that can be used to engage in physical activity, and (2) provide opportunity for mindless snacking.[6]

In a society where technology is becoming an integral part of daily life, it is important for health educators to recognize the implications technology has on children and public health. Left unabated, screen time can pose a threat to the health of our nation's physically inactive and overweight children. Education might focus on helping parents understand their role in providing limits for screen time and their role in providing encouragement and support for children's physical activity pursuits.

The "Built" Environment

Few children in this study walked to or from school (less than one day average per week walking to school and 1.11 days average per week walking home or somewhere else after school per week). Although walking to or from school was not found to be a statistically significant predictor of children's physical activity behavior in this study, other studies indicated that the proximity and accessibility of schools from a child's home as a correlate of children's physical activity.[45, 46]

Active commuting to and from school is a potential daily avenue for children to accumulate physical activity.[46, 47] The National Institute of Environmental Health Sciences concluded that rural areas without sidewalks, limited access to walkable play spaces and inability to actively commute (bicycle or walk) played a large role in fostering a sedentary lifestyle and dependency on vehicles (thus adults) for transportation[48, 49] and *Healthy People 2010* listed an objective to "increase the proportion of trips made by walking" for children 5-15 years to and from school (if 1 mile or less) from 31.0% in 1995 to 50.0% in 2010.[40]

The middle school in which this study was conducted was located in the center of downtown with sidewalks and crosswalks leading to the school. Although this study did not assess the proximity of children's home to the middle school (due to confidentiality reasons, children's address was not assessed), it was assumed by the researches that some of the children may have lived near the school because there were a few neighborhoods within one mile of the school. One consideration for a future study may assess the distance children live from the school and other play spaces. Health educators should also consider the importance of "walkability" education and policy

Table 4. Ordinal Logistic Regression of Predisposing, Reinforcing, and Enabling Predictors of Physical Activity Level

Independent Variables	Estimate	Standard Error	Significance	Odds Ratio	95% Confidence Interval	
Predisposing factors						
Physical activity self-efficacy[a]	1.22	.55	.03*	3.40	.13	2.32
Attraction to physical activity[a]	1.25	.49	.01*	3.48	.28	2.21
Physical activity competence[a]	.50	.38	.19	1.64	-.25	1.25
Reinforcing factors						
Parental role modeling[a]	-.41	.30	.18	.67	-1.00	.19
Parental influence[a]	-.51	.43	.23	.23	-1.35	.33
Peer influence[a]	-.33	.38	.39	.39	-1.08	.42
Enabling factors						
Average number of days walk to school per week[b]	.04	.15	.77	1.04	-.24	.33
Average number of days walk home from school per week[b]	.01	.10	.96	1.01	-.19	.20
Access to playgrounds, parks, or gyms[a]	.07	.16	.66	1.07	-.24	.38
Neighborhood safety[a]	.26	.28	.36	1.30	-.29	.81
Number of physical activities or teams	.24	.13	.06	1.27	-.01	.48
Access to equipment[a]	.90	.35	.01*	2.46	.21	1.59
Average minutes of TV per day[c]	-.04	.12	.72	.96	-.27	.19
Average minutes of computer or video gaming per day[c]	-.14	.10	.18	.87	-.34	.06

*$P < 0.05$

[a]Strongly Disagree = 1; Disagree = 2; Agree = 3; Strongly Agree = 4.

[b]I do not walk to (or home or somewhere else after) school on an average week = 0, 1 day per week = 1, 2 days per week = 2, 3 days per week = 3, 4 days per week = 4, 5 days per week = 5.

[c]I do not watch TV (or play video or computer games) on an average school day = 0, Less than 1 hour per day = 1, 1 hour per day = 2, 2 hours per day = 3, 3 hours per day = 4, 4 hours per day = 5, 5 or more hours per day = 6.

development when addressing childhood physical inactivity.

Predisposing Factors

Physical Activity Self-efficacy

Middle school children had a high level of physical activity self-efficacy. They felt confident that they could successfully participate in a sport or physical activity and overcome the barriers that were associated with the activity. Their high physical activity self-efficacy played a large role in predicting their after-school physical activity behavior. Physical activity self-efficacy is a predisposing factor that can be fostered and cultivated through effective, quality programming designed to improve children's knowledge, attitudes, and skills in learning and performing a variety of physical activities.[19]

For a majority of the sample, children agreed to strongly agree that they had the confidence to engage in physical activity and overcome barriers associated with accomplishing their goal. Children who felt that they had skills and confidence to participate in physical activities were more likely to engage regularly in physical activities than children who were less self-efficacious. Health educators should support people and programs that influence children's confidence in physical activity. Parents, physical education teachers and coaches can impact whether a child has adequate opportunity to participate in physical activity. Furthermore, these significant others affect a child's attitude toward physical activity. A coordinated effort to promote physical activity from influential people in children's lives must be considered.

Using a Coordinated School Health program framework maximizes a school's positive interaction among health education, physical education, health services, nutrition services, counseling/psychological/social services, health school environment, health promotion for staff, and family and community involvement.[50] Health educators should work with schools, parents, communities and policy makers to develop and maintain quality, coordinated efforts to promote an environment and policies conducive to physical activity. Additionally, health educators should promote communication among parents, teachers and community members regarding the benefits of targeting the development of children's physical activity self-efficacy. Since physical education is the primary form of instruction that children receive to learn physical activity knowledge, attitudes, skills, and ultimately behaviors, a collaborative approach between health education and physical education curricula should span throughout preschool and high school.

Attraction to Physical Activity

Children were attracted to physical activity pursuits such as exercising, playing sports, playing physical games or activities. Sallis et al.[19]and Dishman et al.[51] deemed enjoyment as an important factor that influenced children's physical activity behavior. When middle school children enjoy participating in after-school sports or physical activity programs, the likelihood that they will continue participation is greater. The average number of after-school sports or other physical activities that the children in this sample participated in during the time of the study was 1.45. Children typically participate in after-school programs or sports that attract them. It is important for communities and schools to offer a variety of physical activities for children of all ages and skill levels so that children can find and participate in activities that attract and hold their interest.

Reinforcing Factors

Research shows that children who feel that significant others in their lives are supportive of their physical activity pursuits are more likely to be physically active than children whose do not have significant others who are supportive.[18, 52, 53] Yet, this study did not find statistical significance between children's after-school physical activity level and any of the three proposed reinforcing factors. Middle school age is typically a transition time for children. Once a child reaches an age where significant others play a role in their lives, typically around 10 years old, parents have less influence and peers and other adults (e.g., coaches, teachers) play a greater role.[52, 54] Despite the low test-retest reliability correlation for peer influence in the pilot test and not yielding statistical significance in the study, previous research[26, 37, 38, 53] has shown peer influence to be correlated to children's physical activity. Future research with rural, middle school children should focus on developing a more reliable and valid survey instrument, perhaps beginning with an elicitation process to qualitatively determine characteristics and motivations to comply with influential peers.

Limitations

Utilizing self-reported surveys in this study presented the potential for limitations in the validity of physical activity participation recall, screen time usage recall and social desirability. For example, children may have over-estimated their physical activity time and under-estimated their sedentary, screen time.[55] The quantification of children's physical activity remains difficult. Although the reliability and validity of self-report instruments are frequently called into question, researchers continue to use them due to their economical attributes and their availability to be utilized with large groups of subjects. Objective assessment of physical activity can include the use of pedometers and accelerometers[56] for data collection although for large, population-based studies, motion sensors are costly and require user-education sessions and are limited in their ability to measure non-ambulatory activity such as swimming or weightlifting.

The recruitment of a convenience sample from one middle school may not allow generalizablity to other middle school children's after school behaviors throughout the state. Since the town in which the study was conducted only housed one middle school, the findings from this study should be used to further programming tailored for rural, middle school children.

Although the cross-sectional study design approach may present limitations in the study, the practical implications of identifying significant predictors of the samples' physical activity are great. Tailoring physical activity interventions for middle school children at the study middle school based upon

their needs is an effective strategy in effective program planning.[26] For the children in this study, having a high self-efficacy, having activities that are attractive to them, and having access to sports and physical activity equipment are important factors that keep children active after school.

TRANSLATION TO HEALTH EDUCATION PRACTICE

The majority of time children spend being physically active occurs during non-school hours.[57-60] Middle school children have approximately 6½ hours of time after school each day to devote to a variety of pursuits.[29] The National Coalition for Promoting Physical Activity, a coalition of leading health and fitness organizations such as National Association for Sport and Physical Education, American College of Sports Medicine, American Cancer Society and American Heart Association, recommends that children utilize their after-school times (typically from 3:00 p.m. to 6:00 p.m.) for physical activity.[61] Since physical activity experts suggest that children participate in one hour or more of physical activity daily, it is crucial that children utilize a portion of this valuable time for health-enhancing physical activities.

This study found that over half of the middle school children reported being active after school each day and that low socioeconomic status children were more physically active than not-low socioeconomic children. Although this sample was relatively physically active, research shows that as children grow older, their physical activity levels decrease. Furthermore, most research also shows that low socioeconomic status adults engage in less physical activity that their not-low counterparts. Further research however should examine reasons (e.g., farming) why low SES children reported themselves to be more active than not-low SES children; these results are contrary to results from other studies.

Since health behaviors that are adopted in childhood are oftentimes maintained throughout adulthood,[14, 62] it behooves health educators to identify factors predictive of children's physical activity so that effective interventions may be developed to increase the physical activity participation among all children. This study indicated that the most influential factors that predicted children's participation in physical activity were physical activity self-efficacy, attraction to physical activity and access to sport or physical activity equipment and supplies.

Consequently, the area in which this study was conducted was rural and poor; it is critical for health educators to cultivate children's physical activity behaviors. After-school interventions developed for rural communities with low socioeconomic status families should focus on building children's self-efficacy, provide fun activities in which children are attracted, and provide equipment for children to take home with them. Increasing overweight and obesity rates should prompt practitioners to consider implementing both physical activity and nutrition interventions specific to rural children. Communities will see long-term health benefits when strong foundations for physically active lifestyles are established and sedentary activities are minimized.

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