

The Relationship between Peer and/or Friends' Influence and Physical Activity among Elementary School Children: A Review

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Abstract

One modifiable factor linked to the current childhood obesity epidemic is inactivity among children. In hopes of providing researchers and practitioners with insight for combating the childhood obesity epidemic, the objective of this review is to synthesize the research on the association between peer and/or friends' influence and elementary school-aged children's physical activity behaviors. Six databases were searched to identify studies published within the last 20 years that assess the relationship between peer and/or friends' influence and elementary school-aged children's physical activity behaviors. Analysis of the 13 studies meeting these criteria identified four processes through which peers and/or friends may be associated with elementary school-aged children's physical activity behaviors: modeling, social support, popularity and victimization. While more research is needed in this area, this review suggests that there is an association between peer and/or friends' influence and elementary school-aged children's physical activity levels. Peer victimization may be negatively associated with children's physical activity levels. Peer support is positively correlated with children's physical activity. Among boys, popularity may be associated with physical activity. Finally, evidence suggests that peer models may be effective at enhancing physical activity among girls and children with low physical activity self-efficacy.

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Introduction

A significant number of American children are obese. Indeed, over the last three decades, childhood obesity prevalence rates have increased to epidemic proportions (Institute of Medicine, 2006; Story, Kaphingst, & French, 2006). Along with unhealthy eating practices, one significant modifiable factor linked to the current childhood obesity epidemic is insufficient physical activity among children (Strong et al., 2005). Currently children in the United States are engaging in inadequate levels of physical activity. Data indicate that less than half of elementary school-aged children are meeting the physical activity recommendations of 30 to 60 minutes of moderate to vigorous physical activity (MVPA) on a daily basis (Troiano et al., 2007). Extensive research

suggests that insufficient physical activity during the elementary school-aged years can contribute to a variety of health problems (Strong, et al., 2005). To design effective physical activity interventions targeting elementary school-aged children, it is important to understand what factors contribute to elementary school-aged children's physical activity.

The Youth Physical Activity Promotion (YPAP) model, which is based on the Precede-Proceed framework, is a theoretical model that was created to help better understand the factors that influence children's physical activity behaviors. This model is one of the few that have been designed specifically to explain the influences on children's physical activity. The YPAP model suggests that different predisposing, enabling, and reinforcing factors can directly

impact children's physical activity (Welk, 1999). Specifically, the YPAP model divides the correlates of physical activity into three domains: (1) the individual-level predisposing factors, comprising the cognitive and affective considerations, such as the child's self-efficacy, the child's attitudes and beliefs regarding physical activity, the child's perception about their own physical competence, and the child's enjoyment derived from physical activity; (2) the enabling factors that include personal attributes (e.g., skills and fitness level) and environmental or access variables; and (3) the reinforcing social factors that influence children's physical activity behavior, such as family, coaches, teacher, and peer influence (Welk, 1999).

Researchers have found that reinforcing factors play a major role in influencing children's predisposition toward physical activity (Welk, 1999). One important reinforcing social agent is a peer and/or a friend (Sallis, Prochaska & Taylor, 2000). In the context of peer and/or friends' influence, researchers have pointed to a number of constructs to explain the important role peer and /or friend reinforcing factors play in children's physical activity behavior, including peer modeling, peer support, popularity, and peer victimization. Peer modeling refers to behavioral, cognitive, and affective changes that arise from observing a peer or a friend model a behavior (Schunk, 1987). Peer support is a form of social support, such as perceived available support, or received support from others, that stems from the peer group (Vaux, 1988). The type of peer support may include social integration or companionship (when participating in physical activities together); emotional support (such as encouragement); informational support; and instrumental support (such as providing equipment or transportation) (Voorhees et al, 2005). Popularity among peers arises when an individual member of a peer group is liked by a great number of their peers; is influential in setting group opinions; and is influential in defining the boundaries of membership in the most exclusive social group (Adler, Kless, & Adler, 1992). Finally, peer victimization refers to a peer relationship where the recipient of the

negative behaviors not only is rejected, but is also subjected to a variety of physical or verbal negative victimization behaviors, such as being picked on, being hit, having other kids say mean things to him or her, or being the target of gossip (Ladd, Kochenderfer, & Coleman, 1997; Kochenderfer & Ladd, 1996).

A few researchers have explored the link between peers and/or friends and children's physical activity (Partridge, Brustad, & Stellino, 2008; Voorhees et al., 2005; Allison et al, 2005; Prochaska, Rodgers, & Sallis, 2002; Sallis et al., 2002, Smith, 1999; Smith & McDonough, 2008; Anderssen & Wold, 1992). Given the limited research on the subject, scholars have called for a more close examination of the link between peers and/or friend and children's physical activity behavior (Smith & McDonough, 2008). In particular, since little research has focused on elementary school age children, further examination of the association between peer and/or friends' influence and elementary school children's physical activity behavior is warranted. First, ample evidence exists suggesting that it is especially important to focus on promoting physical activity during the elementary school-aged years. For instance, physical activity levels begin to decline rapidly starting at age ten (Kelder et al., 1994; Strauss et al., 2001; Trost et al., 2002). Further, physical activity behaviors consolidate by 6th grade and tend to remain stable into adulthood (Kelder et al., 1994; Lindquist, Reynolds, & Goran 1999). Moreover, existing emotional, physical, and cognitive differences between elementary school-aged youth and middle and high school-aged youth necessitate an examination of the relationship between peer and/or friends' influence and elementary school-aged children's physical activity behaviors.

Objective

The objective of this article is to provide a review of current studies assessing research on the relationship between peer and/or friends' influence and elementary school-aged children's physical activity levels. Peers are the large group of people with whom the child interacts (Bukowski & Newcomb, 1984; Masters & Furman, 1981). Members of a peer group are

individuals who are at or near the same age (Smith, 2007). A friend is an individual with whom the child has a close and mutual relationship (Bukowski & Hoza, 1989; Bukowski & Newcomb, 1984; Masters & Furman, 1981).

Methods

Data Sources

Six databases were searched to identify studies for this review, including: PUBMED, Physical Education Index, Dissertations & Theses (ProQuest), ERIC (EBSCO), SportDiscus (EBSCO) and SCHOLAR.GOOGLE.COM. Search terms included a combination of the following terms: peer, friend, subjective norms, social support, child, youth, physical activity, and physical exercise. The initial search yielded 467 articles.

Inclusion and Exclusion Criteria

Only articles meeting the following criteria were selected for this review: 1) study was conducted after 1988 and was published in a peer review journal or as a dissertation/thesis; 2) study investigated peer and/or friends' influence and elementary school-aged children's physical activity behaviors; 3) study participants were elementary school-aged children (K- 6th grade). Since some elementary schools include the 6th grade, studies that included 6th grade children were included in the review. Studies that focused on children with a disability or clinical disorders (e.g., physical disability, learning disability, behavioral disorders, autism, and attention deficit disorder) were excluded. The reference list of the selected studies was reviewed for additional potentially relevant studies. Further, studies the author was aware of were also included in the review.

Data Extraction

There were a total of 13 studies that met this final criterion.

Results

Each study included in this literature review was systematically summarized and evaluated to identify any relationships between peers and/or

friends and elementary school-aged children's physical activity behaviors. The results are reported in Table 1. A synthesis of studies reviewed is presented below and is organized according to the four constructs described earlier to explain the role peer and /or friends' reinforcing factors play in children's physical activity behavior: peer modeling, peer support, popularity, and peer victimization.

Peer and/or Friends' Modeling

Three of the 13 articles reviewed suggest that peer and/or friends' modeling may influence elementary school-aged children's physical activity behaviors. One study was qualitative and the other two utilized an experimental design. Jago et al. (2009) conducted several focus groups and found that elementary school-aged children believe that having a friend model physical activity had a profound influence on their own initiation of physical activity. In addition to qualitative evidence on friends' modeling, Horne, Hardman, Lowe, and Rowlands (2009) and Weiss, McCullagh, Smith, and Berlant (1998) provide quantitative evidence that peer modeling may influence children's physical activity levels. Utilizing an experimental design, Horne et al. assessed the impact of an eight day physical activity intervention that included peer modeling. Peer modeling entailed fictional characters (Fit n' Fun Dudes) portrayed as cool and physically active children. The intervention also included an 11 week maintenance phase. The researchers found that the 8 day peer modeling based physical activity intervention was effective at increasing both boys and girls' physical activity levels to more than 30 minutes of MVPA per day. Further, they found a gender interaction effect. Girls' physical activity rates, compared to boys, increased at a higher rate at post-intervention. Specifically, following the 8 day intervention, girls demonstrated an increase of 3,822 steps per day (35% increase), but boys demonstrated an increase of 2,785 steps per day (21% increase). In addition to the post-intervention differences among the genders, the authors found that girls' physical activity rates continued to increase after the maintenance phase, whereas boys' physical activity rates returned to base-line levels. At follow-up (i.e.,

one week following the maintenance phase), the physical activity levels of boys in the experimental group were no different than the boys in the control group. In contrast, compared to girls in the control group, the physical activity levels of girls in the experimental group increased from post intervention levels by an additional 2,873 steps (26% increase). Horne et al. explained that the gender interaction effect may be due to boys having higher physical activity rates pre-intervention implementation, as well as girls' tendencies to be more responsive than boys to health education programs.

Weiss et al. (1998) also utilized an experimental design to assess the impact of peer modeling on children's physical activity skill performance and physical activity self-efficacy. The researchers were interested in evaluating the impact of two types of peer models on physical activity skills and physical activity self-efficacy of children: a peer coping model and a peer mastery model. Physical activity self-efficacy is the conviction that one can successfully overcome perceived barriers and perform required skills necessary to engage in physical activity (Bandura, 1997). A peer coping model is one who demonstrates difficult and gradual learning and task performance, whereas a peer mastery model is one who demonstrates errorless performance (Schunk, 1989). Participants were randomized into three groups and either viewed a seven minute video of peer coping models, peer mastery models, or cartoons unrelated to physical activity. Researchers found a moderate to large effect size of the both peer modeling groups on physical activity skill and physical activity self-efficacy. Further, it is important to note that the peer coping group reported higher physical activity self-efficacy than the peer mastery group.

Peer and/or Friends' Support

Seven of the 13 studies reviewed provide evidence that peer and/or friends' social support may influence elementary school-aged children's physical activity behaviors. In these studies peer and/or friends' support were manifested in two ways: (a) social integration

and companionship by being active together and attending a physical activity event together; and (b) emotional support in the form of peer or friends' encouragement of physical activity. These studies utilized a qualitative, cross-sectional, longitudinal, and experimental research design.

In a qualitative study discussed previously, Jago et al. (2009) found that a friend's verbal encouragement of physical activity and being physically active with friends was associated with elementary school-aged children's physical activity initiation. Similarly, in another qualitative study, Kunesh, Hasbrook and Lewthwaite (1992) examined peer and/or friends' influence and physical activity. Researchers observed participants' interactions with their peers during lunch time. Analysis of the data found that peer encouragement was associated with children's participation in physical activity. Finally, Gosling, Stanistreet, and Swami (2008) found that when girls engaged in physical activity with a friend they reported experiencing fun while being active. Research indicates that fun during physical activity is a predictor of physical activity behaviors among elementary school-aged children (Biddle, 1992).

Voorhees et al. (2005) conducted a cross-sectional study to examine the relationship between peer support and 6th grade girls' physical activity levels. Peer support was measured utilizing the Physical Activity Social Network Questionnaire which assessed: who are the girl's three closest friends, how often the girl is active with these friends, and the physical activity levels of these three friends. Physical activity was measured with an adapted version of the physical activity questionnaire for older children (PAC-Q). This instrument assesses a child's level of physical activity in a variety of situations and times. Findings provide evidence that there is a positive relationship between being active with friends and girls' physical activity levels. Indeed, researchers found that frequency of engaging in physical activity with friends was the most significant independent predictor of 6th grade girls' physical activity

levels.

In another cross-sectional study, Lever-Landis et al. (2003) examined the relationship between being active together with a friend as well as friends' encouragement and girl's physical activity behaviors. Questions used to determine a girl's level of friend support for physical activity included: 1) "Do your friends ever exercise with you?" and 2) "Do your friends ever encourage you to exercise?" Physical activity was assessed by an interviewer administered questionnaire for children, which attempted to gauge the girls' weekly physical activity levels (i.e., number of weight bearing physical activities and total hours of weight bearing physical activity). Findings indicated that friends' social support, in the form of being active together with friends and friends' encouragement of physical activity predicts physical activity behavior.

In a similar cross-sectional study three years later, researchers examined the associations between being active together with friends and friend encouragement and physical activity levels among 718 sixth grade girls (Springer, Kelder & Hoelscher, 2006). To measure being active together with friends and friends' encouragement, the researchers used a self-assessment questionnaire inquiring whether friends did physical activities with them and whether friends encouraged them to be physically active. Further, physical activity level was measured in daily minutes using a physical activity checklist. The authors found that while the correlations were modest, being physically active with friends and friends' encouragement were positively related to higher daily minutes of moderate to vigorous physical activity in bivariate analyses and that these relations maintained significance in the regression analysis of the full model. However, friends' encouragement was the only variable significantly related to vigorous physical activity in the regression analysis. The authors concluded that the results of the study suggest that friends take a prominent role in influencing physical activity among adolescent girls.

Extending the cross-sectional findings of Lever-Landis et al. (2003) and Springer et al., 2006, a longitudinal study by Davison and Jago (2009) examined the change in peer support for girls' physical activity as they aged into adolescence. The study also assessed whether girls, who remain active during adolescence, are differentially exposed to peer support when compared with girls who do not remain active. The study followed 174 non-Hispanic, white, 9 years old girls into adolescence (i.e., 15 years old). The researchers found that the girls' reported peer support had increased between the ages of 9 and 11. One major limitation of this study is that girls objective physical activity levels were only measured at ages 13 and 15. This limitation prevented the authors from drawing conclusions on the impact that peer support during the elementary school years has on girls' physical activity levels.

Finally, in an experimental study Rittenshouse (2008) explored the impact of peer support by assessing the amount and the intensity of physical activity lean boys and at risk-for being overweight and overweight boys perform in a controlled setting with a peer who is of similar weight and with a peer of different weight. During each of the three conditions, children were provided with an accelerometer and had access to both sedentary and physical activities for a total of 30 minutes. The researchers found that the at-risk for being overweight and overweight boys, compared to lean boys, engaged in statistically significantly lower levels of physical activity when they are alone. At risk-for overweight and overweight boys increased their physical activity levels from the alone to both peer conditions; however, the increase was not statistically significant. There was no difference in the amount of physical activity that at-risk for being overweight and overweight boys did in the two peer conditions (i.e., peer of similar weight and peer of a different weight). However, at-risk for being overweight boys and overweight boys reported statistically significant higher attraction for physical activity in the peer with different weight condition, compared to the alone condition. Though not a statistically significant difference, at risk for being overweight and overweight boys reported the

lowest level of attraction to physical activity in the similar weight condition. Lean boys did not increase physical activity from the alone to either of the peer conditions. The researcher concluded that these results point to the need for peer interaction in the at-risk for being overweight and overweight boys to increase physical activity.

Popularity

Three of the 13 studies suggest that popularity is associated with elementary school-aged children's physical activity levels. Adler, Kless, and Adler (1992) conducted a qualitative study to identify the determinants influencing elementary school-aged boys and girls popularity among their peers. This study entailed four years of observations in and outside of the school setting including an examination of peer influence and children's physical activity levels. Researchers found that boys' popularity appears to relate with the boy's performance in physical activities. In contrast, the findings did not suggest that performance in physical activities is associated with girls' popularity among their peers. Instead, girls' popularity appears to relate with girls' physical attractiveness. Additionally, Jago et al. (2009) found boys reported a positive association between high ability in physical activity and popularity.

In addition to qualitative evidence, quantitative evidence exists suggesting that popularity is associated with children's physical activity levels. Chase and Drummer (1992) utilized a questionnaire to determine which factors boys and girls believed determined their personal, male, and female popularity. This questionnaire was developed utilizing four criteria used in prior research on determinants of children's popularity (Buchanan, Blankenbaker, & Cotton, 1976; Thirer & Wright, 1985). Those four criteria were being good at sports, being handsome or pretty, having lots of money, and making good grades. Children were asked to rank these four criteria. Researchers found that boys most frequently reported being good in sports as the number one factor to determining personal and male popularity. Further, boys most frequently ranked appearance as the most important determinant of girls' popularity. On

the other hand, girls most frequently reported that physical appearance was the most influential determinant of personal, male, and female popularity. Researchers found that each of these beliefs increased with grade level.

Peer Victimization

Three of the 13 studies reviewed provide evidence that peer victimization may be negatively associated with elementary school-aged children's physical activity behaviors. In a qualitative study discussed earlier, Kunesh, et al. (1992) found that peer victimization is negatively associated with girls' physical activity rates. Specifically, the researchers found that direct peer victimization (i.e., criticism) during physical activity at school, especially from male peers, was negatively associated with girl's future physical activity in the school context. However, direct victimization from male or female friend was not negatively associated with future physical activity participation in the neighborhood context. Researchers suggested that girls' attribution for the victimization may explain why peer victimization was more detrimental than friends' victimization. Specifically, the researchers explained that children at this age are concerned with peer evaluation and consequently are likely to attribute victimization from a peer to an internal cause, such as low physical activity ability. On the other hand, when a friend who the child trusts verbally victimizes him or her the child is likely to attribute it to an external cause such as the child's sarcastic personality rather than true poor physical ability. Further, Ziviani et al. (2006) conducted a cross-sectional study to examine the relationship between various factors, including peer victimization and elementary school-aged children's physical activity levels. Findings indicate that direct verbal peer victimization explained 12% of the variance in children's objectively measured weekend physical activity levels; and 11% of the variance in parent's reports of their child's physical activity levels.

Lastly, in a previously discussed experimental study, Rittenshouse (2008) assessed, among other things, the role of peer victimization on children's level of physical activity. Peer

victimization was assessed utilizing the Children Self-Experience Questionnaire Self-Report

which consists of three subscales assessing the frequency of particular victimizing experiences (e.g., overt victimization). Researcher found that at-risk for being overweight and overweight boys, compared to lean weight boys, reported statistically significant higher levels of peer victimization. Peer victimization among at risk for being overweight and overweight boys was negatively correlated with physical activity in the alone condition. In contrast, when at-risk for/overweight children engaged in physical activity with peers of either similar or different weight, their reported level of peer victimization did not impact their physical activity levels.

Discussion

The studies reviewed provide evidence that there is a relationship between peer and/or friends' influence and elementary school-aged children's physical activity. Findings from this review suggest that peer support is associated with children's physical activity. Specifically, peer support in the form of peer or friends' encouragement, is associated with elementary school-aged children's initiation and maintenance of physical activity, regardless of gender (Jago et al. 2009; Kunesh et al. ,1992; Lever-Landis et al., 2003). Among girls, and overweight boys there is a positive association between peer support in the form of being active with a friend and physical activity. With exception of one study which utilized an experimental research design to examine the impact of peer support in the form of being active with a friend, these studies were correlational and qualitative in nature. Future research in this area should consider additional studies utilizing an experimental design to assess the impact of peer support on children's physical activity levels.

Analysis of the literature in this review suggests that peer models may be particularly effective at increasing girls' physical activity levels (Horne et al, 2009). These finding are particularly important for obesity prevention efforts. Research provides evidence that elementary

school-aged girls, are less active than, elementary school-aged boys (Troost, Pate, Ward, Saunders & Riner,1999; 2002; Zask, Van Beurden, Barnett, Brooks, & Dietrich, 2001). Hence, elementary school-aged girls, compared to elementary school-aged boys, are at greater risk for becoming inactive and obese adults. The results from the studies reviewed here suggest that designing interventions that incorporate peer and/or friend models may have a promising potential for success at increasing physical activity level among girls in elementary schools.

Review of the literature suggests that peer coping models may be particularly effective at increasing physical activity levels among children with low physical activity self-efficacy. Physical activity self-efficacy is one of the strongest predictors of physical activity among children (Troost et al., 1999; Van Der Horst, Paw, Twisk, Van Mechelen, 2007). Research provides evidence that elementary school-aged children with low physical activity self-efficacy are less active than elementary school-aged children with high physical activity self-efficacy (Foley et al., 2008; O'loughlin, Paradis, Kishchuk, Barnett, & Renaud, 1999; Sharma,Wagner, & Wilkerson, 2005; Trost et al., 1999). Hence, elementary school-aged children with low physical activity self-efficacy, compared to their more efficacious peers, are at greater risk for becoming inactive and obese adults. Further, research has demonstrated that interventions that have had a positive impact on physical activity self-efficacy had a corresponding positive impact on physical activity levels (Annesi, 2006). Weiss et al. (1998) which was reviewed in this article, demonstrated that peer coping models, compared to master peer models, were more effective at increasing physical activity self-efficacy of children with low physical activity self-efficacy. Therefore, future interventions focused on promoting physical activity level among elementary school children with low self-efficacy should consider incorporating peer coping models in the design of the intervention.

In addition to peer models, analysis of the literature suggests that changing girls' beliefs about physical activity may enhance their

physical activity levels. The studies reviewed suggest that among girls physical attractiveness is a key determinant of popularity. Perhaps if girls acquire the belief that regular physical activity will increase their physical attractiveness, they would be more motivated to engage in physical activity. Accordingly, public health campaigns targeting elementary school-aged girls may be able to increase girls' physical activity levels by emphasizing the message that active girls are attractive girls. Future research should evaluate the efficacy of such a public health campaign on girls' physical activity, beliefs, and behaviors.

Also, the studies reviewed suggest that boys may be motivated to engage in physical activity as a way to achieve popularity among their peer group (Alder et al., 1992; Gosling et al., 2008; Jago et al., 2009). These studies may explain one of the factors that cause boys to engage in more physical activity than girls. (Sarkin, McKenzie, & Sallis, 1997; Zask et al., 2001).

Aside from the positive associations, this review identified a possible negative association between peer and/or friends' influence and elementary school-aged children's physical activity. Specifically, it appears that peer victimization may have a negative association with children's physical activity behaviors. The

literature reviewed suggests that to promote lifelong physical activity habits, it may be important to identify and prevent peer victimization, especially in the form of verbal peer victimization while a child is engaging in physical activity. Future research could assess the impact of an intervention designed to identify and eliminate peer victimization during recess or physical education classes.

Conclusions

Studies assessing the impact of peer and/or friends' influence on elementary school-aged children's physical activity levels are in their infancy and more research is needed in this area. Nonetheless, analysis of the literature provides some evidence that associations between peer and/or friends' influence and elementary school-aged children's physical activity levels exist.

Peer victimization may be negatively associated with children's physical activity levels. Peer support is positively correlated with children's physical activity. Among boys, popularity may be positively associated with physical activity. Finally, evidence suggests that peer models may be effective at enhancing physical activity among girls and children with low physical activity self-efficacy.

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Appendix A

Table 1: Summary of Findings of Studies Conducted to Assess the Impact of a Peer and/or a Friends' Influence on Physical Activity among Elementary School-Aged Children

Author(s) & Year	N	Sample	Design	Measurement of Peer and/or Friends' Influence	Measurement of Physical Exercise	Results
Adler, Kless, & Adler (1992)	N=unavailable	Mostly white middle to upper class elementary school-aged children in a university town.	Qualitative Study utilizing observations	Examined peer popularity among boys and girls	Qualitative study did not include a quantitative measure of physical activity.	Researchers found that the physical domain was a key determinant of elementary school-aged boys and girls' popularity. Boys' popularity appears to relate to their physical abilities. Girls' popularity appears to relate to their physical attractiveness.
Chase & Dummer (1992)	N=478	227 boys and 251 girls in 4 th -6 th grade from three schools in the mid-Michigan area. Schools representative of varied SES and neighborhood locations.	Cross-sectional	Questionnaire assessing personal, male, and female determinants of popularity	Questionnaire assessing determinants of popularity included one item relating to physical activity (i.e., being good in sports).	Among boys, being good in sports, was the most frequently reported top determinant of personal and male popularity. Further, boys most frequently indicated that appearance was the most important determinant of girl's popularity. Among girls, physical appearance was the most frequently rated top determinant of personal, male, and female popularity.
Davison & Jago (2009)	N=174	Non-Hispanic White 9 years old girls	Longitudinal	Questionnaire using three questions from the peer support subscale of the Activity Support Scale instrument.	ActiGraph 7164 Accelerometers were used to assess physical activity intensity and duration.	Peer support increased between the ages of 9 and 11. Since objective physical activity levels were only measured at ages 13 and 15, researchers were unable to draw conclusions on the impact of peer support on physical activity during the elementary school years.
Gosling, Stanistreet, & Swami (2008)	N=32	9-10 year old students from low income schools.	Qualitative study involving focus groups	Children were asked how they thought peers influenced their physical activity levels.	Due to qualitative nature of the study, the study did not utilize a quantitative measure of physical activity.	Participating in a physical activity with a friend was linked with enjoyment of physical activity, which subsequently influenced children's reported maintenance of physical activity.
Horne, Hardman, Lowe & Rowlands (2009)	N=53	21 boys & 26 girls ranging from 9 to 11 years of age, living in a semi-rural area in Wales. 14-15% were participating in the free school meal program.	Randomized experimental design	Peer influence entailed fictional characters (Fit n' Fun Dudes) portrayed as cool and physically active children.	Physical activity was measured using the Yamax Digiwalker SW-200 pedometer.	Post intervention, children in the experimental group, compared to children in the control group, had significantly higher physical activity rates. There was an interaction effect, girl's physical activity levels increased more than boys. At follow-up, girls in the experimental group's physical activity levels continued to increase. Boys in the experimental group's physical activity levels were no different than those of boys in the control group.
Jago et al. (2009)	N=113	10 -11 year old children representative of high, middle and low SES.	Qualitative study utilizing focus groups.	Among other things, researchers asked children how their peers influenced their physical activity levels.	Due to qualitative nature of the study, researchers did not quantify a measure of physical activity.	Findings suggest that there is an association between peers and physical activity. Boys reported a positive association between high ability in physical activity and popularity. In contrast, some girls reported high ability in physical activity as negatively associated with popularity. Friends influenced physical activity initiation and maintenance by modeling physical activity, verbal encouragement of physical activity and increasing fun experienced during physical activity.
Kunesh, Hasbrook, & Lewthwaite (1992)	N=8	11 -12 year old girls from a white upper middle-class suburban school.	Mixed methods design utilizing observations, interviews & questionnaires	Peer and/or friends' influence on physical activity was examined through observations of participants engaged in physical activity with their peers during lunch recess time, sociometric evaluation; and interviews to assess participant's perceptions of their peers' treatment of them during physical activity.	Three measures were used to assess physical activity. Those include: 1) number of seasons girls participated in organized sports; 2) Frequency of physically active play girl engaged in during lunch recess; and 3) how often girl engaged in physical activity for the explicit purpose of exercise.	Researchers found an association between encouragement and future physical activity. Further, peer victimization, especially from male peers at school, was negatively associated with future physical activity. Also, direct victimization from male or female friend was not negatively associated with future physical activity participation.
Lever-Landis et al. (2003)	N=354	8-11 year old girls recruited from a Girl Scout Troop. 84% were White	Cross-sectional	Friends' support for physical activity was assessed utilizing a subscale from the Children's Physical Activity Questionnaire (CPAQ).	Physical activity was assessed by an interviewer administered questionnaire.	Friends' support for physical activity predicted weight bearing exercise.
Rittenhouse (2008)	N=24	12 at-risk for overweight and overweight 8-12 year old boys & 12 lean 8-12 year old boys recruited from the local community.	Experimental Design	Researcher examined peer influence by assessing the impact of three different social contexts on a child's physical activity levels. Those three contexts were: 1) alone, 2) with a peer of similar weight,	ActiGraph GT1M Accelerometers were used to assess physical activity intensity and duration. Also, several mediators of physical activity were measured including; physical activity self-efficacy,	In alone condition, at-risk for overweight and overweight boys, compared to lean boys, accumulated a statistically significantly less amount of physical activity. At-risk for overweight and overweight children reported more peer victimization which was negatively correlated with physical activity. At-risk for overweight and overweight boys increased their liking of physical activity

				and 3) with a peer of different weight.	peer victimization, and liking of physical activity.	from the alone condition, to the different weight peer condition.
Springer, Kelder & Hoelscher (2006)	N=718	6 th grade girls (mean age 11.6) recruited from 12 public middle schools located in suburban area in a large city in Texas. 72% were White.	Cross-sectional	Self-assessment questionnaire inquiring whether friends did physical activities with them and whether friends encouraged them to be physically active.	Physical activity was measured in daily minutes using a physical activity checklist (i.e., Self-Administered Physical Activity Checklist).	While the correlations were modest, the authors found that friend physical activity participation and encouragement were positively related to higher daily minutes of MVPA in bivariate analyses and that these relations maintained significance in the regression analysis of the full model. However, friends' encouragement was the only variable significantly related to VPA in the regression analysis.
Voorhees, et al. (2005)	N= 228	6 th grade girls from 6 middle schools participating in the Trail of Activity in Adolescent Girls multicenter intervention trial (TAGG). Girls were from a wide range of ethnic groups and socioeconomic strata.	Cross-sectional	Physical activity social network questionnaire assessing friends' support for physical activity through inquiring: who are the girls' 3 closest friends, how often the girl is active with these friends, and the physical activity levels of these three friends.	Physical activity was measured with an adapted version of the physical activity questionnaire for older children (PAC-Q). This instrument assesses a child's level of physical activity in a variety of situations and times.	Frequency of engaging in physical activity with friends was the most significant independent predictor of girls' physical activity levels.
Weiss, McCullagh, Smith, & Berlant (1998)	N=24	18 boys and 6 girls with a mean age of 6.2 recruited from a local YMCA.	Randomized experiment	Peer influence entailed both peer coping models and peer mastery models. Peer coping models were children on a 7 minute video who demonstrated improvements in their swimming ability skills and verbalized increasing levels of swimming self-efficacy and a more positive attitude towards swimming. Peer mastery models were children on a 7 minute video who demonstrated swimming skills at a high ability, verbalized high levels of self-efficacy and low task difficulty, and a positive attitude towards swimming skills.	Physical activity behavior was indirectly measured through 6 swimming skills, self-efficacy, and swimming fear. Two graduate students rated each child's swimming skills and fear of swimming. Self-efficacy was assessed with an interview administered instrument.	Results indicate a moderate to large effect size of the both peer modeling groups on physical activity skill, self-efficacy and swimming fear reduction.
Zaviani, et al. (2006)	N= 50	26 boys and 24 girls and their parents. Children's mean age was 7.74 and were drawn from elementary school representative of upper, middle, and lower SES.	Cross sectional	Peer influence was assessed through one item on a piloted survey that asked parents to rate their perceptions of their child's exposure to verbal peer victimization (teasing).	Physical activity was assessed through both parent report and objective measures. On the parent survey, parents were asked to report the frequency with which their child engaged in physical activity. Children's objective physical activity levels were assessed utilizing the Yamax Digi-Walker SW-700 pedometer.	Verbal peer victimization predicted: 12 % of the variance in children objectively measured weekend physical activity levels; and 11% of the variance in parent's reports of their child's physical activity levels.