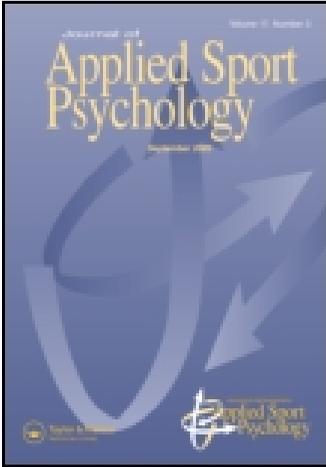


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Promoting School Students' Physical Activity: A Social Ecological Perspective

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Guided by a social ecological perspective, the aim of this study was to investigate the predictive strength of individual (barrier self-efficacy), social environmental (support from parents, friends, physical education teachers), and physical environmental variables (equipment accessibility, neighborhood safety) toward physical activity among school students. Participants were 285 students enrolled in a suburban public school. Hierarchical linear regression analysis highlighted the influence of self-efficacy, social support from parents, friends, physical education teachers, and accessible equipment on students' physical activity. The findings indicated that physical educators and health promoters need to consider multiple factors as they design effective interventions to promote physical activity and prevent physical inactivity among school students. This study also supported the use of a social ecological perspective to investigate students' physical activity.

Promoting children and adolescents' regular physical activity participation is a public health priority (U.S. Department of Health and Human Services [USDHHS], 2000; 2008; 2010a). Despite well-documented health benefits of engaging in regular physical activity, American school students do not meet recommended physical activity guidelines to promote health within the time allotted for instruction in school physical education programs (McKenzie, 2001; National Association for Sport and Physical Education [NASPE], 2004). The prevalence

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of physically inactive youth is also rising in other developed and developing countries worldwide (Sisson & Katzmarzky, 2008). Based on the notion that engagement in regular physical activity during childhood and adolescence may positively influence lifetime activity levels, and that physical activity is important to school students' health and academic performance (Centers for Disease Control and Prevention [CDC], 2010; Daley, 2002), it is important to examine how to increase the proportion of school students who engage in regular physical activity within and beyond school settings (e.g., leisure-time physical activity). Identifying theory-based factors that influence physical activity behavior has the potential to provide a clearer understanding of the decisions school students make regarding being physically active. This effort also can facilitate the development of effective intervention strategies aimed at the promotion of physical activity among school students. The main purpose of this study, therefore, was to investigate the relative influences of individual, social environmental, and physical environmental factors on physical activity behaviors among middle school students based on the social ecological perspective.

A Social Ecological Perspective

Social ecological refers to individuals' interactions with their physical and socio-cultural environment (Sallis & Owen, 1999). Over the past decades, a social ecological perspective of human behavior has been used as paradigms and organizational frameworks for research and action in many disciplines, such as tobacco control (Elder & Stern, 1986) and human development (Bronfenbrenner, 1979). A social ecological perspective of human behavior was first introduced in the health field as a means of gaining a better understanding of the role of human behavior in chronic diseases associated with lifestyle choices (McLeroy, Bibeau, Steckler, & Glanz, 1988).

The social ecological perspective is attractive for health promotion programs and interventions because multiple levels of influence are acknowledged rather than a conventional unitary focus on individual-level factors (Sallis, Owen, & Fisher, 2008). Of particular importance in this approach is the simultaneous consideration of the interaction of individual factors and contextual factors. Therefore, a social ecological perspective addresses both the dynamics of individual health behavior and gives better direction to the design of effective intervention strategies. For example, it is suggested that interventions are most effective if they encompass multiple levels of influences, such as interpersonal, intrapersonal, institutional, community and public policy (Brownson, Baker, Housemann, Brennan, & Bacak, 2001; MacIntyre & Ellaway, 2000).

A Social Ecological Perspective and Physical Activity

To date, published research on the predictors or correlates of physical activity behaviors has primarily focused on individual-level factors such as self-efficacy (Sallis, Prochaska, & Taylor, 2000; Trost, Saunders, & Ward, 2002; Welk, 1999). Self-efficacy, a key construct of the social cognitive theory (Bandura, 1986, 1997), represents an individual's confidence in his or her ability to participate in a specific behavior (e.g., "how confident are you that you can be physically active?"). In the previous studies, exercise self-efficacy (i.e., individual's judgments of their capabilities to engage in regular exercise and physical activity) and barriers to self-efficacy (i.e., confidence in ability to participate in exercise and physical activity in the midst of difficult situations such as bad weather, schedule conflicts, and lack of time and support) have been frequently examined. In the physical activity field, many review articles document that, compared with exercise self-efficacy, barrier self-efficacy is a more important and consistent correlate of physical activity (e.g., Sallis et al., 2000; Trost et al., 2002).

Although individual-level factors, such as barrier self-efficacy, are important correlates of physical activity participation in the previous studies, the individual-level approach often ignores the broader environmental context in which the physical activity of individuals occurs (Sallis et al., 2008). Given that most physical activity behaviors occur in social and physical contexts, the relative influences of the relevant social and physical contexts in which such physical activity behaviors take place have received increased attention (Ferreira, Horst, Wendel-Vos, Kremers, Lenthe, & Brug, 2006).

According to a social ecological perspective, the term “environment” refers to the objective factors that are physically external to the person (Stokols, 1996). Although there is no simple definition of the social environment, it appears that the existence of a supportive social network (providers of social support) has an important influence on physical activity and sport participation. Social support has been broadly defined as resources provided by significant others (Rees, 2007). In the present study, examples of social support include parents’ support at home, friends’ support in school, and teachers’ support in the physical education classroom (Carr & Weigand, 2001; Rees, 2007; Zhang, Solmon, Kosma, Carson, & Gu, 2011).

Although McLeroy et al. (1988) did not specify physical environment factors in their social ecological approach, Stokols (1996) contends that physical environment factors are essential elements of social ecological perspective of health behavior. Examples of physical environment influences include the availability of physical activity facilities, convenience of facilities, and the safety of physical activity settings.

Given the fact that physical activity must take place in specific physical settings that are likely to influence an individual’s choice to be physically active, a social ecological perspective is particularly suited for studying physical activity. In addition to individual factors, such as barrier self-efficacy, the inclusion of social and physical environmental factors in the investigation of physical activity behaviors among school-aged students by applying a social ecological perspective is an important area in physical activity research (Brownson et al., 2001; Sallis, Bauman, & Pratt, 1998; Sallis et al., 2008).

A social ecological perspective provides an innovative theoretical framework to guide the investigation of multiple factors influencing physical activity behavior change (Stokols, 1996; Sallis et al., 2008). The use of a social ecological perspective to promote physical activity has received prominent attention in key publications such as the *Healthy People 2020* (USDHHS, 2010a). For example, *Healthy People 2020* included a physical activity objective to improve access to physical activity facilities (USDHHS, 2010a). Environmental and policy changes are also the primary strategy proposed for obesity control by the World Health Organization, the Institute of Medicine (2001) report on preventing childhood obesity, 2008 Physical Activity Guidelines for American (USDHHS, 2008), and the National Physical Activity Plan for the United States (USDHHS, 2010b).

To date numerous researchers have advocated the use of a social ecological perspective of human behavior as an organizational framework to identify specific correlates that may influence adults’ physical activity (e.g., Addy, Wilson, Kirtland, Ainsworth, Sharpe, & Kimsey, 2004; De Bourdeaudhuij, Sallis, & Saelens, 2003). For example, Addy et al. (2004) found that perceptions of active neighbors, having access to sidewalks, and using malls were associated with regular walking. Additionally, respondents who had good street lighting, trusted their neighbors, and used private recreational facilities, parks, playgrounds, and sport fields were more likely to be physically active. It is widely recognized that incorporating interpersonal, intrapersonal, and environmental and policy factors can increase our understanding about change in adults’ physical activity (Sallis et al., 2008).

Although the social ecological perspective provides an attractive conceptual basis for understanding the specific correlates of physical activity behavior, there is limited empirical

evidence of the application of this perspective to examine physical activity behavior among school-aged students (Panter, Jones, & Van Sluijs, 2008; Welk, 1999). Motl and his colleagues (Motl, Dishman, Trost, Saunders, Dowda, Felton, et al., 2005) examined the effects of neighborhood safety and perceived equipment accessibility on adolescent girls' physical activity across a 1-year period. They found neighborhood safety did not have an effect on physical activity, but equipment accessibility exhibited a statistically significant cross-sectional, but not longitudinal, effect on adolescent girls' physical activity. To increase school students' activity levels and achieve public health goals, there is an emerging trend calling for social ecological approaches that incorporate individual, social environmental, and physical environmental factors to complement the conventional research paradigm of individual-centered influences on physical activity (Brownson et al., 2001; Sallis et al., 2008).

The main purpose of this study, therefore, was to investigate the relationships among individual (barrier self-efficacy), social environmental (parents' support, friends' support, and physical education teachers' support), physical environmental variables (equipment accessibility and neighborhood safety), and physical activity behaviors among middle school students based on the social ecological perspective. The second purpose of this study was to determine the relative contributions of individual (barrier self-efficacy), social environmental (parents' support, friends' support, and physical education teachers' support), physical environmental variables (equipment accessibility and neighborhood safety) to students' physical activity participation. Specifically, the following research question was addressed: After accounting for the influence of barrier self-efficacy, what are the unique contributions of social environmental and physical environmental variables to middle school students' physical activity behavior? Based on the literature reviewed, it was hypothesized that: (a) individual (barrier self-efficacy), social environmental (parents' support, friends' support, and physical education teachers' support), and physical environmental variables (equipment accessibility and neighborhood safety) would be positively related to students' physical activity behavior; and (b) social environmental and physical environmental variables would positively contribute to middle school students' physical activity participation after the influence of barrier self-efficacy had been taken into account.

METHOD

Participants

Participants in this study were 285 middle school students (95 sixth-graders, $M_{\text{age}} = 12.38$; 98 seventh-graders, $M_{\text{age}} = 13.29$; 92 eighth-graders, $M_{\text{age}} = 14.46$; 142 boys, 143 girls) enrolled in regular physical education classes in a suburban public school located in a southern state in the United States. Situated in a safe neighborhood, this school has good quality physical activity equipment for students to use, and the outdoor areas (e.g., playground, field) and indoor areas (e.g., gym) are in good condition and spacious enough for students to be physically active. Ages of the participants ranged from 12 to 15 years of age ($M = 13.36$, $SD = 1.03$). The participants were from middle and upper middle income families. The majority of the participants were Caucasian (81.4%), followed by 9.5% African American, 2.8% Asian American, 2.5% Hispanic American, and 3.9% other. The participants were selected from nine different classes that offered coeducational physical education taught by three certified teachers.

Measures

Demographic Variables

To characterize the participants in this study, self-reported personal information on grade, age, gender, and race were obtained from the questionnaires.

Individual Factor

To assess students' barriers to self-efficacy, an eight-item scale that pertained to confidence in students' ability to be physically active under various conflicting situations was used in this study (Motl et al., 2000). Participants were asked to rate each of the eight statements by responding to the stem, "How do you feel about each of the following statements?" Typical items were "I can ask my parents or other adult to do physically active things with me," and "I can be physically active during my free time on most days no matter how busy my day is." The items were rated on a 5-point scale with responses ranging from 1 (*disagree a lot*) to 5 (*agree a lot*). The mean of these eight items was taken to give an overall indication of the magnitude of a student's efficacy beliefs for physical activity. Acceptable internal consistency and validity have been reported for this measure.

Social Environmental Factors

Social environmental factors were assessed by using two previously validated questionnaires. The participants' perceived social support from friends and parents was assessed with a scale developed by Prochaska, Rodgers, and Sallis (2002). The scale consisted of a total of 10 items, five addressing friends' support and five addressing parents' support. The stem for these items was "During a typical week, how often . . ." Items related to friends' support included questions about encouragement and praise from friends, engaging in activities with friends, and being teased by friends. Questions assessing parents' support focused on providing encouragement and praise, engaging in activities, and providing support, such as transportation. One example related to friends' support is "your friends encourage you to do physical activities or play sports." An example related to parents' support is "your parents or guardian encouraged you to do physical activities or play sports." Students rated each item on a 5-point Likert scale, ranging from 1 (*none*) to 5 (*every day*). Acceptable internal consistency of the items evaluating social support from friends and parents has been shown.

Perceived social support from physical education teachers was assessed by a 6-item scale with response options ranging from 1 (*disagree a lot*) to 5 (*agree a lot*; Daigle, 2003). On this instrument, participants reported physical education teachers' support focused on providing fair treatment toward each student, participating in activities in class, providing encouragement and praise, giving help based on students' needs, and listening to students' opinions or concerns. The stem for these items was "In my physical education class." Teacher support statements included "My teacher really listens to what I have to say," and "my teacher encourages me to be the best that I can be." The reliability coefficient was acceptable in the previous study (Daigle, 2003), and these scales demonstrated adequate internal reliability coefficients in this study.

Physical Environmental Factors

The physical environment scale developed by Motl et al. (2005) was used to assess students' perceived equipment accessibility and perceived neighborhood safety. It is a 4-item scale with responses ranging from 1 (*disagree a lot*) to 7 (*agree a lot*). Sample answer items include "There are playgrounds, parks, or gyms close to my home or that I can get to easily," and "It is difficult to walk or jog in my neighborhood because of things like traffic, no sidewalks, dogs, or gangs."

Physical Activity

The Physical Activity Questionnaire for Older Children (PAQ-C) was used to assess students' levels of physical activity. It is a 7-day recall questionnaire intended to assess moderate and vigorous physical activity. The questions from the PAQ-C were scored on a 5-point scale and used to calculate a composite physical activity score. The PAQ-C is a reliable and valid

measure of physical activity for students beyond Grade four (Kowalski, Crocker, & Faulkner, 1997). The internal consistency of this subscale for the present sample was satisfactory.

Procedures

University Institutional Review Board, the school district, the school principal, and the physical education teachers granted permission to conduct the study, and participants and their parent or legal guardian provided written assent forms and informed consent forms prior to the study. Due to the importance of physical education teachers' support on students' physical activity and the connections with physical education teachers (Zhang et al., 2011), all questionnaires were administered and collected during regularly scheduled physical education classes. These questionnaires were distributed to all students under the supervision of the researchers with the assistance of the physical education teachers. Survey-based instructions were briefly explained before students filled out these questionnaires. To minimize students' tendency to give socially desirable responses, they were encouraged to answer the questions truthfully and were informed that their teachers would not have access to their responses. Students spent approximately 20 min completing all questionnaires.

Data Analyses

As noted above, participants in the study were enrolled in nine different classes that offered coeducational physical education. Analyses of variance (ANOVA) were conducted for each dependent variable and there were no significant differences among the classes. Therefore, classes were not included in any subsequent analyses when we examined the relationships among the variables. In addition, gender has often been cited as a variable of concern in studies investigating physical activity (Sallis et al., 2000). Although this was not the focus of this study, we tested for gender effects and no significant gender differences emerged in preliminary analyses. Consequently, gender was not included in the main analyses.

Three steps were used to analyze the data by using the Statistical Package of the Social Sciences (SPSS 16.0, SPSS Inc.). First, internal consistency estimates and descriptive statistics were calculated on all study variables. Second, Pearson product-moment correlations were computed to examine the interrelationships among the study variables. Third, a hierarchical regression technique was used to examine whether social environmental factors and physical environmental factors accounted for a significant portion of unique variance beyond that accounted for by the individual factors (Gu, Solmon, Zhang, & Xiang, 2011; Heuzé, Sarrazin, Masiero, Raimbault, & Thomas, 2006). With reference to the social ecological perspective that underpinned this study (Addy et al., 2004; Sallis et al., 2008; Welk, 1999), the enter method within each block was used to determine the predictive strength of the individual factors (Block 1), social environmental factors (Block 2), and physical environmental factors (Block 3) on physical activity behavior. In doing so, it is possible to investigate the relative contributions of social and physical environmental factors on students' physical activity after the influence of individual factors has been taken into account. An alpha level of .05 was used for all statistical analyses.

RESULTS

Descriptive Analyses and Scale Reliability

Alpha coefficients and descriptive statistics for each measure are presented in Table 1. Alpha coefficients for self-reported measures demonstrated acceptable levels of reliability (Nunnally,

Table 1
Descriptive statistics, internal reliabilities, and correlations among variables (N = 285)

Variables	<i>M</i> ± <i>SD</i>	1	2	3	4	5	6	7
1. Self-efficacy	3.68 ± .75	(.73)						
2. Friends' support	3.48 ± .68	.56**	(.64)					
3. Parents' support	3.56 ± .84	.46**	.61**	(.81)				
4. Teachers' support	3.26 ± .86	.39**	.37**	.25**	(.83)			
5. Equipment accessibility	3.87 ± 1.00	.38**	.36**	.30**	.26**	(.70)		
6. Neighborhood safety	4.02 ± 1.05	.29**	.18**	.17**	.04	.22**	(.65)	
7. Physical activity	3.23 ± .68	.55**	.50**	.43**	.36**	.36**	.15*	(.75)

Note. Cronbach's alpha coefficients are provided along the diagonal; *M* = mean; *SD* = standard deviation; * $p < .05$; ** $p < .01$.

1978). The mean scores of the self-reported variables were above the midpoint score showing positive perceptions of the study constructs among middle school students.

As shown in Table 1, correlations between the variables are positively and significantly related to one another (r s ranging from .15 to .61, $p < .01$), except for the relationship between teachers' support and neighborhood safety. Barrier self-efficacy as an individual variable was positively correlated with social environmental variables, physical environmental variables, and physical activity participation. Social environmental variables were positively associated with physical environmental variables and physical activity participation. Furthermore, physical environmental variables were also positively related with physical activity participation in the present study.

The results of the hierarchical regression are reported in Table 2. As shown, in the first block barrier self-efficacy accounted for 30.6% of the variance in physical activity ($\beta = .55$, $p < .01$). When social environmental factors (parents' support, friends' support, and physical education

Table 2
Hierarchical regression of the social ecological factors on activities (N = 285)

Independent variables	<i>R</i> ²	<i>R</i> ² Change	β	<i>F</i> Value
Block 1	.306	.306		124.79**
Self-efficacy			.55**	
Block 2	.382	.076		43.35**
Self-efficacy			.34**	
Friends' support			.19**	
Parents' support			.13*	
Teachers' support			.12*	
Block 3	.393	.011		30.00**
Self-efficacy			.32**	
Friends' support			.17**	
Parents' support			.12*	
Teachers' support			.11*	
Equipment accessibility			.11*	
Neighborhood safety			-.03	

Note. *R*² values are cumulative, with each incremental step adding to the variance explained; β values are standardized regression coefficients from the final stage of the regression analysis.

* $p < .05$; ** $p < .01$.

teachers' support) were entered in the second block, the model accounted for an additional 7.6% of the variance in the dependent variable above the influence of barrier self-efficacy. Barrier self-efficacy ($\beta = .34, p < .01$), friends' support ($\beta = .19, p < .01$), parents' support ($\beta = .13, p < .05$), and physical education teachers' support ($\beta = .12, p < .05$) were significant predictors of students' physical activity participation in the second model. Furthermore, the contribution of physical environmental variables (equipment accessibility and neighborhood safety) in the third block was also statistically significant, increasing the variance accounted for by 1.1%. The final model accounted for 39.3% of the variance in self-reported physical activity. Significant predictors, in descending order of importance, were barrier self-efficacy ($\beta = .32, p < .01$), friends' support ($\beta = .17, p < .01$), parents' support ($\beta = .12, p < .05$), physical education teachers' support ($\beta = .11, p < .05$), and equipment accessibility ($\beta = .11, p < .05$). Neighborhood safety was not a significant predictor in the final model.

DISCUSSION

The main purpose of this study was to investigate how individual (barrier self-efficacy), social environmental (parents' support, friends' support, and physical education teachers' support), and physical environmental variables (equipment accessibility and neighborhood safety) influence physical activity behavior among middle school students based on the social ecological perspective. It was hypothesized that there would be positive relationships among the study variables, and that social environmental and physical environmental variables would positively contribute middle school students' physical activity participation after the influence of barrier self-efficacy has been taken into account, and these hypotheses were supported. These findings highlight the contention that supportive social and physical environments can positively influence middle school students' physical activity participation beyond individual factors, and the findings of this study provided preliminary support for the theoretical concepts of social ecological perspective. Although supportive social and physical environments may be mediated through individual factors such as barrier self-efficacy based on previous studies (Motl et al., 2005), it is important to understand the positive predictive strengths of social and physical environmental factors on students' physical activity, which is consistent with social ecological perspective and is the major contribution of this study.

Barrier self-efficacy has consistently been one of the strongest predictors of middle school students' physical activity participation in three regression models in the present study. The findings suggest that when students have high levels of self-efficacy, they tend to persist in the face of difficulty and actively participate in physical activity (e.g., Prochaska, Rodgers & Sallis, 2002; Sallis et al., 2000; Trost et al., 2002). That is, school children with higher barrier self-efficacy were more likely to engage in physical activity regularly than those with low levels of barrier self-efficacy. It should be noted that the standardized regression coefficients for barrier self-efficacy decreased with the addition of other environmental variables in three regression models study ($\beta = .55, .34, .32$, respectively, all $p < .01$). Barriers to physical activity are likely related to lack of social support and the availability of resources. Thus, when social environmental and physical environmental variables are included in the regression models, they may explain some of the variance in barrier self-efficacy.

Consistent with previous studies, this finding highlighted that physical educators and health promoters should focus on enhancing students' barrier self-efficacy in physical activity to encourage them to adopt and maintain regular physical activity (Sallis et al., 2000; Trost et al., 2002). Based on the social cognitive theory (Bandura, 1986, 1997), barrier self-efficacy concerns an individual's confidence to participate in specific exercise and physical activity

behavior in the midst of difficult situations. The primary sources of self-efficacy information include performance experience, verbal persuasion, vicarious experience, and physiological and affective states (Bandura, 1986, 1997). Thus, several strategies can be used to increase students' barrier self-efficacy. For example, students should be given sufficient time and support to practice the motor skills to develop skill proficiency. Identifying situations to overcome specific barriers that have worked in the past would be expected to increase students' barrier self-efficacy. Furthermore, students should be provided verbal persuasion (i.e., social support) by significant others by encouraging them to overcome physical activity barriers or join physical activity programs. Additionally, students' barrier self-efficacy can be enhanced through educational materials that show other students similar to themselves about the strategies they have used to overcome various physical activity barriers. Finally, helping students correctly interpret the different types of arousal they may experience during physical activity is also an effective approach to increase their barrier self-efficacy.

Social support from friends, parents, and physical education teachers emerged as significant predictors of self-reported engagement in physical activity in this study, accounting for a significant portion of the variance beyond the contribution of self-efficacy. Specifically, friends' support played a significant role in the levels of school students' physical activity. More importantly, friends' support was the most important social environmental factors after comparing with the parents' support and teachers' support in the second and third regression models ($\beta = .19, .17$, respectively, all $p < .01$). The results indicate that friends' support is an important contributor to the physical activity of middle school students. From a developmental perspective, this finding makes sense in that by adolescence, peer or friends' support is generally a dominant social factor and plays a critical role in the development of physical activity motivation and engagement. This is consistent with findings concerning peer relationships in sport (Smith, 2003; Weiss & Stuntz, 2004). There are several ways to develop good relationships among middle school students. For example, students can give positive encouragement and constructive feedback to their peers. They can develop strong and positive peer interactions through emphasizing cooperative goals, encouraging problem solving, and sharing decision making in activities. They can dialogue about problems and potential solutions, help each other to reach goals, restructure common activities, and reduce obvious displays of social status. After developing good friendships, students can have positive affective responses that are associated with active participation in physical activity (Weiss & Stuntz, 2004).

Parents' support was also a significant influence on school students' physical activity. Parents' support was an important component of a supportive social environment (Carr, Weigand, & Hussey, 1999; Carr, Weigand, & Jones, 2000). It is noted that although peer or friends becomes more socially important to the middle school students during the later childhood and adolescence, the parents are still important social influences that contribute to students' physical activity engagement (Carr et al., 1999; Carr & Weigand, 2001). The finding of this study suggests that parents have an important function in socializing middle school students to adopt and maintain a physically active lifestyle. This finding indicates that parents can positively support students' physical activity participation through their beliefs and behaviors (Kimiecik, Horn, & Shurin, 1996). For instance, parents can communicate to their children the value of physical education and sport, encourage their children's involvement in physical activity, provide financial support for physical activity equipment and lessons, and watch or attend their children's games and activities. In addition, they can support children's participation by listening to their children's concerns, providing encouragement to participate in physical education and sport, and communicating positive feedback about their children's ability, and make it easier for them to accept failure or make errors (Brustad, 1993; Carr et al., 1999; Carr & Weigand, 2001).

Additionally, perceived physical education teachers' support emerged as a significant, positive predictor of students' physical activity participation, which is consistent with the previous studies (Carr et al., 1999, 2000; Carr & Weigand, 2001; Zhang et al., 2011). Although teachers' support is less important than friends' support and parents' support in this study, this finding supports the notion that social support provided by the physical education teacher is essential for students' engagement in physical activity (Daigle, 2003; Zhang et al., 2011). For example, previous research has shown that physical education teachers can facilitate the adoption of school students' physically active lifestyles through the supportive environment they create in physical education classes. To create an supportive environment, it is recommended that physical education teachers provide students with choice as often as possible, involve students in the decision-making and goal-setting processes, acknowledge students' perspectives and feelings, provide positive and appropriate informational feedback, focus on self-improvement rather than social comparison, highlight the importance of perseverance and effort, demonstrate or establish peer learning groups, give students cooperative tasks with a clearly defined goal, and develop positive teacher-student and student-student relationship based on respect, trust, and caring (Deci & Ryan, 2000; Zhang et al., 2011).

Furthermore, equipment accessibility emerged as a significant physical environmental factor on students' physical activity after self-efficacy and social support from friends, parents, and physical education teachers had been taken into account in the third regression model. This finding provided empirical evidence that increasing the awareness of accessible equipment in the environment might be a means of increasing physical activity among school students. This result was consistent with a previous study examining the effects of perceived equipment accessibility and neighborhood safety on physical activity across a one-year period among adolescent girls (Motl et al., 2005). Although the contribution of equipment accessibility to students' physical activity is relatively small, increasing some forms of physical activity for a large student population in a specific setting may be very important in efforts to promote physical activity levels of school students who are sedentary. It should be noted that although equipment accessibility is important and necessary for students' physical activity in this study, making equipment accessible may not be sufficient to increase students' physical activity. Health promoters and practitioners, therefore, need to provide a supportive social environment in addition to enough equipment within a school or community setting to promote students' physical activity self-efficacy and engagement.

It also should be noticed that not all social support is beneficial, and that support providers such as parents and friends may provide different types of social support. It is important to consider more closely how specific support providers can match their support to students' needs for physical activity participation (Rees, 2007). Finally, given that perceived neighborhood safety was not a predictor of school students' physical activity in this study, more research is needed to examine the influence of the physical environmental factors on school students' physical activity in different settings. Identifying key-specific elements of the perceived physical environment that correlate with physical activity is an important step in the application of the social ecological perspective (Carver, Timperio, & Crawford, 2008; Motl et al., 2005).

From an applied perspective, the results of this study suggest a number of considerations for those interested in promoting school students' physical activity. Specifically, health promoters and practitioners need to develop effective strategies that maximize students' barrier self-efficacy. In addition, it is important to develop a supportive social network because significant others such as parents, friends, and physical education teachers can play a crucial role in promoting physical activity. Students should be proactive in their use of social support, and they need to know how to maximize the available social support in their social network.

Finally, creating an accessible and supportive physical environment is an important component of physical activity promotion programs. Physical activity environments with adequate equipment, facilities, and space may stimulate students to be physically active.

Although the findings of the present study provided support for the hypotheses, one of the limitations of this study was that the measure of students' physical activity behaviors was self-reported. Future research should include objective assessment techniques, such as accelerometers, pedometers, and heart rate monitors, to accurately measure students' physical activity engagement. In addition, the correlational nature of this study does not support a causal inference. An intervention focusing on developing supportive physical activity environments and tracking students' physical activity levels before and after the intervention is needed. Third, the generalizability of the results should be interpreted cautiously because only a school was used in the present study. One school cannot provide an adequate depiction of the diversity of influences on physical activity behavior. It will be important that future studies obtain a stratified random sample from multiple schools to increase the generalizability of the findings. Furthermore, it should be acknowledged that the social and physical environmental variables in this study accounted for a relatively small amount of variance for physical activity as compared to barrier self-efficacy. This finding suggests that social and physical environmental variables alone are not sufficient to explain students' physical activity. Other individual factors such as barrier self-efficacy can play an important role in promoting students' physical activity. It should be noted that we adopted a specific operational definition of social environmental variables in this study (perceived social support from parents, friends, and physical education teachers). We acknowledge that social environmental variables can be conceptualized in many different ways or in a broader context. Other influential aspects of the social environment include social norms, group cohesion, motivational climate, social provisions. It is important to examine how these different social influences relate to students' physical activity in future studies. Finally, future research would be well-served by using structural equation modeling techniques to assess the potential indirect influences of social environmental and physical environmental variables on physical activity in school students. Given the fact that self-efficacy may mediate the influences of the environmental factors on physical activity, it is necessary to examine the indirect influences of the environmental factors on school students' physical activity in the future study. Although it is not a major purpose of this study, such efforts can provide more detailed information with regard to the nature of the interrelationship among these variables while addressing the potential issue of endogeneity of individual factors.

In conclusion, the results of this study have provided us with a clearer understanding of individual, social environmental, and physical environmental factors to predict middle school students' physical activity participation. Based on the findings and consistent with previous research, this study underscored that barrier self-efficacy was the strongest correlate of physical activity. The findings also highlighted the direct contributions of specific social environmental variables (e.g., social support from friends, parents, and physical education teachers) and physical environmental variables (e.g., accessible equipment) on middle school students' physical activity. These results suggested that higher levels of social support and a supportive physical environment for physical activity were related to higher levels of physical activity participation among school students. Supportive social environments and physical environments can promote middle school students' regular engagement in physical activity and help them adopt and maintain physically active lifestyles. Finally, this study supported the use of the social ecological perspective in the investigation of physical activity among school students. Physical educators and health promoters need to consider multiple factors based on

the social ecological perspective as they design effective interventions to promote physical activity among school students and encourage them to adopt and maintain a physically active lifestyle.

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