

Girls On The Move Program to Increase Physical Activity Participation

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Background: Because physical inactivity poses serious health risks, interventions are urgently needed to reverse increasingly sedentary lifestyles of adolescent girls.

Objective: To determine the efficacy of “Girls on the Move,” a computerized individually tailored physical activity (PA) program plus nurse counseling intervention, in increasing PA.

Method: A phase 2 clinical trial was used with 77 racially diverse sedentary girls from 2 middle schools, who were randomly assigned to either an intervention or control group. After completing computerized questionnaires, each girl in the control group received a handout listing PA recommendations. Each girl in the intervention group received computerized individually tailored feedback messages based upon her responses to questionnaires, as well as individual counseling from the school’s nurse practitioner and telephone calls/mailings from a trained research assistant, to encourage PA. At 12 weeks, both groups responded to questions about PA.

Results: No differences in self-reported PA emerged between the groups. To assess if any subset of the intervention group differed from the control group, the pre- to post-intervention difference in total number of minutes of moderate plus vigorous PA reported for 4 days was used. Of the intervention group, 60% (high-change intervention subgroup) had significantly greater difference scores than those of the control group. Differences between high- and low-change intervention subgroups for PA correlates were explored. When baseline scores were controlled, week 12 post-intervention mean scores for the high-change intervention subgroup were found to be significantly greater than those for the low-change intervention subgroup for perceived benefits of PA ($p = .026$), PA self-efficacy ($p = .023$), and enjoyment of PA ($p = .010$).

Discussion: Future efforts to increase PA participation might include strategies for enhancing perceived benefits, self-efficacy, and enjoyment of PA.

Key words: female adolescents, intervention, physical activity

PA participation decreases markedly among girls across adolescence. This precipitous decline begins at the outset of adolescence (Kimm et al., 2002) or around the time of entrance to middle school. The increasingly sedentary lifestyle of adolescent girls (Patrick et al., 2004) poses a serious threat to public health (Dietz, 1998) and is a major risk factor for becoming overweight (Patrick et al., 2004), the prevalence of which has increased dramatically in recent years from 9.7% (years 1988-1994) to 15.5% (years 1999-2000) (Ogden, Flegal, Carroll, & Johnson, 2002). Escalation in the prevalence of obesity is even more striking for ethnic minorities, such as African Americans (Ogden et al., 2002), and may be reflected in racial health disparities. Consequences of being overweight in adolescence include type 2 diabetes, hypertension, high cholesterol, and psychosocial problems (Dietz, 1998).

Interventions to increase PA that are culturally-sensitive, developmentally appropriate, gender-specific, and individually tailored to address unique personal needs are urgently needed to curtail the overweight epidemic (Clemens & Hayman, 2004; Dowda et al., 2004; Neumark-Sztainer, Story, Hannan, and Rex, 2003; Taylor et al., 1999). Knowledge of personal factors influencing PA, such as barriers perceived by certain subgroups, as well as an understanding of strategies for overcoming barriers, can enhance anticipatory guidance (Robbins, Pender, & Kazanis, 2003). For this study, the researchers employed a PA counseling intervention called “Girls on the Move”, which was individually tailored for adolescent girls.

Individually tailored programs provide information and change strategies based upon assessment of an individual’s status on correlates identified as influencing a behavior, such as PA (Kreuter, Farrell, Olevitch, & Brennan, 2000). Compared to standard health promotion materials, tailored interventions have a greater probability of addressing individual needs and being remembered or perceived as interesting (Ryan & Lauver, 2002). Advances in computer

technology have created the capacity to generate data-driven messages tailored to the individual on multiple psychosocial correlates (Bull, Kreuter, & Scharff, 1999). Computer-based surveys generate data comparable to that obtained with paper and pencil (Norman, Sallis, & Gaskins, in press). Youth prefer the uniqueness of computer-based administration (Joinson, 1999).

Although their potential to effect behavior change is likely, individually tailored computer programs, which include predetermined assessment questions and related feedback messages, have limits. The assessment-feedback structure that makes the programs interactive cannot fully approximate the immediacy and interactivity of face-to-face communication. Individually tailored computer programs, therefore, should be viewed as powerful tools to complement, rather than replace, direct health professional counseling (Kreuter et al., 2000).

Evidence is lacking regarding the most effective mix and intensity of intervention strategies for maximal effect in different population groups (U. S. Preventive Services Task Force, 2002). Only one study, known as the Patient-Centered Assessment and Counseling for Exercise plus Nutrition (PACE+) trial, was found that tested the effectiveness of various counseling approaches in increasing PA among adolescents. Participants, who were recruited from outpatient clinics, completed a computerized assessment, created tailored behavior change plans (incorporated goal setting, problem-solving, and social support), and received counseling from their care provider. Each participant was then randomly assigned to 1 of 4 groups: no-further-contact group or 1 of 3 extended-contact groups. Extended-contact groups received either mail alone (every 2 weeks), infrequent mail (every 6 weeks) and telephone calls (every 6 weeks), or frequent mail (every 2 weeks) and telephone calls (weekly). All 4 groups had significant improvements in self-reported moderate PA from baseline to 4-month follow-up. Vigorous PA did not improve. This finding may have been due to the fact that 74% of the 117

participants self-reported sufficient vigorous PA at baseline (Patrick et al., 2001). Patrick and colleagues (2001) concluded that combining a computerized behavior change program with provider counseling was feasible for use with adolescents. Although the weak study design precludes drawing conclusions regarding the intervention's effectiveness in increasing adolescent PA, combined approaches are encouraged (Clemens & Hayman, 2004).

Current recommendations to enhance PA participation among adolescent girls call for multi-component PA interventions, particularly those that are school-based (Clemens & Hayman, 2004). The purpose of this study was to examine the efficacy of a two-component intervention (computerized, individually tailored PA program plus nurse counseling) on the PA participation of middle school girls. The Health Promotion Model (HPM) (see Figure) (Pender, Murdaugh, & Parsons, 2002) and the Transtheoretical Model (TTM) (Prochaska & DiClemente, 1984) were integrated to tailor the "Girls on the Move" intervention.

Since no single theory can account for all of the complexities associated with behavior change, integration across major theories is recommended in research (Prochaska, Redding, & Evers, 2002). According to the HPM (Pender et al., 2002), prior related behavior and various personal factors influence behavior-specific cognitions and affect. Because HPM constructs are subject to modifications through actions of health professionals, the constructs constitute critical targets in an intervention directed at motivating individuals to commit to a plan of action and engage in desired health-promoting behavior. Individually tailored computerized feedback messages can address diverse participant responses related to each construct. This approach can decrease the time that health professionals would have to spend addressing each construct in a session. This study specifically targeted each participant's perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect (enjoyment), and

interpersonal influences (Pender et al., 2002) since these constructs are identified as important PA determinants (Sallis, Prochaska, & Taylor, 2000).

The TTM (Prochaska & DiClemente, 1984) is directly applicable to the work of health care professionals. The model implies that lack of consideration of an individual's stage of change when implementing interventions to alter behavior will decrease intervention effectiveness (Lyznicki, Young, Riggs, & Davis, 2001). The five stages of change identified in the TTM include: Precontemplation, contemplation, preparation/planning, action, and maintenance. Individuals in precontemplation have no intention to take any action concerning a behavior in the foreseeable future and are characterized as being unmotivated. Individuals in contemplation intend to take action within the next six months and those in preparation intend to make a change usually in the next 30 days. Individuals in contemplation and preparation are likely to respond to programs that focus on changing behaviors, such as PA. Action and maintenance are characterized by individuals who have made modifications in their behavior sufficient enough to reduce risk of disease, either within the past six months or beyond the six-month time period, respectively (Prochaska & DiClemente, 1984).

Method

A pretest/posttest, control group design was employed to examine the efficacy of a computerized, individually tailored PA program plus nurse counseling intervention on the PA participation of middle school girls. The University of Michigan Health Sciences Review Board approved procedures for protecting subjects.

Participants

Sixty-one of 262 girls attending one middle school (23.3 %) and 43 of 281 girls (15.3%) from another middle school agreed to participate. Five of the girls returning signed

consent/assent forms did not participate due to lack of English language proficiency, last minute refusal, or relocation to another district, yielding a sample size of 99. Of the 99 girls completing the initial set of computerized questionnaires, 22 were not included in the study since they reported they were active for at least 60 minutes five or more days a week (action/maintenance stage) or not planning to be active in the next six months (precontemplation stage). Each of these 22 girls received a certificate of participation and age-specific recommendations for PA (U. S. Department of Health and Human Services [USDHHS], 2000). The remaining 77 girls, each of whom were identified as being in either the contemplation or preparation stage (based upon their personal responses to questionnaire items), were included in the study.

Procedure

To obtain in-depth, age-specific information concerning proposed PA determinants identified in the HPM (Pender et al., 2002), four focus groups (5 to 10 girls per group) were conducted with 6th, 7th and 8th grade girls. Specific goals of the focus groups were to: 1) Explore perceptions concerning PA determinants; 2) Identify strategies for overcoming barriers and enhancing PA enjoyment, self-efficacy, and social support; and 3) Determine PA benefits among girls in this age group. Based upon feedback received from the girls, minor modifications were made to enhance the thoroughness and relevance of questionnaires previously used by Garcia and colleagues (1995) to measure HPM constructs (with the exception of PA enjoyment). Subsequently, experts in health promotion, behavior change, pediatrics, interactive health communications, and adolescent PA/fitness reviewed the instruments and concluded that they were valid for use with this population.

Permission to conduct the study was obtained from administrators of two middle schools located in low socioeconomic geographic areas in the Midwest. Parents/guardians received

letters inviting girls who were inactive most days of the week to participate. Girls with health conditions limiting PA were excluded. Parent/guardian consent and assent from girls regarding participation were obtained.

Computer assignment to either an intervention or control group was based upon a numerical code that included the school (1 or 2) and instructional grade (6th, 7th, or 8th). Flip-of-a-coin randomization identified the grade/school assigned to each condition. Table 1 presents the sequence of events that occurred from baseline to post-intervention.

The 12-week study was conducted in each school's wellness center (WC) during advisory periods. After explaining the study, the researcher recorded height, weight, and body mass index (BMI). Each participant responded to questionnaires presented on a laptop computer. Questionnaires elicited demographic information; PA frequency, intensity, duration, and readiness; and information regarding the HPM constructs of interpersonal influences, activity-related affect (PA enjoyment), self-efficacy, and perceived benefits and barriers of PA (Pender et al., 2002). Following questionnaire completion, girls in the control group received age-specific PA recommendations (USDHHS, 2000). They were asked to return to the WC in 12 weeks to answer questions about their PA.

At three distinct time periods during the 12-week study, each girl assigned to the intervention group received tailored feedback messages and nurse counseling to assist her to increase her PA. First, after responding to questionnaires at baseline, 3 weeks, and 9 weeks, each girl received supportive individually tailored feedback messages presented by computer and based upon personal responses to questionnaire items. Girls required 45 minutes to 1 hour to complete the computer program at baseline (answer questionnaires; read feedback messages) and 20 to 30 minutes to complete each subsequent computer session. Upon completion of the

computer program, each girl met for 10 minutes with the school's pediatric NP to discuss her PA goals. The counseling was guided by a computer-generated one-page summary of each girl's responses to the questionnaires. Both the girl and the NP signed a form/contract entitled "My Exercise Goals" to indicate mutual agreement with goals to be achieved by the participant. At baseline, a magnet with the "Girls on the Move" logo was provided to each girl for posting the contract in a place where she would see it everyday. All girls assigned to the intervention group completed the first three computer sessions, received computerized tailored feedback messages, and, following each of the three computer sessions, met with the nurse for PA counseling.

Immediately following and 6 weeks after each girl's initial visit, the researchers mailed a tip sheet to the parents/guardians to specifically guide them in helping their daughters to be active. One week, 6 weeks, and 11 weeks after the initial visit, a trained research assistant, using a communication script created by the researchers, contacted each girl by telephone to assess her progress in achieving goals and assist her with renegotiating her goals as necessary.

When girls returned to the WC at 3 and 9 weeks after their initial visit, they completed an abbreviated computer program consisting of questionnaires and tailored feedback messages targeting perceived PA barriers and self-efficacy. Following questionnaire completion, each girl met with the NP to discuss the computer-generated summary of responses and engage in contract renegotiation as necessary. Prior to the start of the intervention, both NPs received 4 hours of training conducted by the researchers. NPs participated in role playing activities until they demonstrated proficiency with conducting counseling sessions. Each NP received a detailed training manual that included written scripts to guide PA counseling sessions with participants.

During the 12th week, girls in the control and intervention groups returned to the WC and completed the posttest consisting of all psychosocial and PA questionnaires. No tailored

feedback messages were received by girls in either group during this final session. Height, weight, and BMI were determined. Each girl received a certificate for participation as well as a \$15.00 gift certificate to a store of her choice. All 77 girls completed the entire 12-week study.

Instrumentation

Benefits. A 20-item Perceived Benefits Questionnaire was used to identify each girl's reasons for being active (e.g., to take care of myself; to have more energy). Girls used the following response choices to identify the importance of each benefit to them personally: (1) Not at all true, (2) Not very true, (3) In between, (4) Sort of true, and (5) Very true). Cronbach's alpha was .90.

Barriers. Using a 23-item Perceived Barriers Questionnaire, the girls rated the frequency of facing each barrier when trying to be active (e.g., I am not motivated; I am too busy): (1) Never, (2) Rarely, (3) Sometimes, (4) Often, and (5) Very often. Internal consistency was .86.

Self-efficacy. A 19-item Perceived PA Self-Efficacy Questionnaire determined each girl's confidence in her ability to overcome barriers to PA. Girls used a 5-item Likert-type scale, ranging from (1) Not at all true to (5) Very true, to indicate the degree that they would be active in the presence of certain barriers to PA (e.g., I'm sure that I can still do my exercise even if I am not motivated; I'm sure that I can still do my exercise even if I am too busy). Internal consistency was .91.

Enjoyment. Motl and colleagues (2000) modified the original 18-item Physical Activity Enjoyment Scale (PACES) (Kendzierski & DeCarlo, 1991) based upon evaluative feedback from focus groups of 8th grade girls and found that the modified 16-item PA Enjoyment Scale (PACES) was a valid measure for use with African American and Caucasian adolescent girls. In

this study, the researchers used the modified 16-item PACES (e.g., when I am active, I find it fun; when I am active, my body feels good) and found the internal consistency to be .87.

Interpersonal Influences. To assess interpersonal influences, girls first identified 3 people who could help them the most to be active. Social support was determined by how often the girls indicated that each of the three people performed PA-related tasks for them (0 = Never, 1 = Sometimes, 2 = Often). For interpersonal norms, the girls indicated how much each of the three people expected them to participate in PA (0 = Not at all, 1 = Sort of, 2 = A lot, or 3 = Not sure). Exposure to models of exercise behavior was determined by how often the three people performed light, medium, or hard exercise (0 = Never, 1 = Sometimes, 2 = Often, or 3 = Not sure). For interpersonal norms and models, “not sure” was coded as a “0” similar to the response choices “not at all” and “never”, respectively. Responses for social support, interpersonal norms, and exposure to models of exercise behavior were summed to obtain a score for each of the three measures of interpersonal influence. Internal consistency was .86 and .81 for the Social Support and Exposure to Models of Exercise Behavior Scales, respectively. Since participants responded to a single item for each helpful person, internal consistency for the Interpersonal Norms Scale was not assessed.

Stage of Change. A PA staging questionnaire based upon the TTM (Prochaska & DiClemente, 1984) was used to assist girls in describing their PA and stage of change (PA readiness). Girls described their PA by indicating the number of days in a typical week that they were active for 60 minutes or more. Girls selecting 0 to 4 days indicated their readiness by answering a question with 3 response choices (to determine if they were in the precontemplation, contemplation, or preparation stage of change). Girls selecting 5 or more days were directed to a question with 2 response choices (to determine if they were in action or maintenance stage of

change). Findings from a previously conducted study involving adolescents supported the construct validity of the PA staging measure (Hagler, Calfas, Norman, Sallis, & Patrick, in press).

Physical Activity. At baseline and at 12 weeks, girls responded to the Child and Adolescent Activity Log (CAAL), which was adapted from the instrument used by Garcia and colleagues (1995), to describe PAs that they had participated in during the past 2 weekdays and the past weekend (Saturday and Sunday) and to rate the intensity of each activity (medium or hard). A researcher was available to assist each girl with reporting number of minutes of PA since preliminary work indicated a tendency for over-reporting. Some girls reporting 4 hours of an activity, such as roller skating, initially reported 240 minutes of vigorous PA, but failed to consider time taken for rest or snack breaks. Girls in this study were informed that PA involved only time spent moving or being active enough so that they were breathing hard and sweating and their heart was beating fast. Examples of PA were also provided to enhance understanding (e.g.- biking, swimming, and dancing). Illustrations of young females walking/running were provided to help the girls evaluate intensity. Test-retest reliability and validity for the CAAL have been established (Garcia, George, Coviak, Antonakas, & Pender, 1997).

Data Analysis

The Statistical Package for the Social Sciences (SPSS, 2002) was used. PA variables measured at week 1 (baseline) and week 12 (post-intervention) were examined employing univariate statistics. Repeated measures analysis of variance (ANOVA)—condition X time—was used to identify differences between the intervention and control groups in self-reported number of days of PA per week, stage of change, and number of minutes of moderate and vigorous PA. Independent t-tests were used to determine differences between groups regarding

PA values reported at week 12 minus those reported at week 1 (difference scores). Repeated measures ANOVA and analysis of covariance (ANCOVA) were performed to test for differences in the correlates of PA participation between an intervention subgroup having PA difference scores significantly higher than those of the control group and another subgroup with PA difference scores similar to those of the control group.

RESULTS

Demographic Characteristics of Sample

Of the 45 girls in the intervention group, 25 were African American, 13 were European American, and 7 represented other races. The racial distribution of the 32 girls in the control group included: 12 African American, 15 European American, and 5 from other races.

Participant characteristics are presented in Table 2. No significant differences occurred between intervention and control group participants regarding any characteristics or between pre-and post-intervention BMI for any subgroup identified in Table 2. All 77 girls who completed baseline measures returned to complete their subsequent computer and, if in the intervention group, nurse counseling sessions as scheduled. No attrition occurred across the 12-week study period.

Comparison of Intervention and Control Groups

Intervention and control groups were compared across time, from week 1 to week 12. No significant baseline differences were noted between the groups for: 1) number of days per week of PA; 2) stage of change; 3) total number of minutes of either moderate or vigorous PA for 4 days; and 4) total number of minutes of moderate plus vigorous PA for 4 days, previous weekday, two weekdays, and two weekend days (Table 3). Week 1 scores for each of the PA variables were subtracted from week 12 scores. Resulting difference scores for the intervention

group were not significantly different from those for the control group for any PA variables.

Comparison of Intervention Subgroup with Control Group

To assess if any subset of the intervention group differed significantly from the control group regarding PA, the pre- to post-intervention difference in the number of minutes of moderate plus vigorous PA reported across 4 days on the CAAL was used. Of the intervention group, 27 of the 45 participants (60%) had pre- to post-intervention difference scores greater than 30 minutes. Because these participants had significantly greater difference scores than those of the control group, $F(1, 57) = 4.52, p = .04$, they were identified as the high-change intervention subgroup.

Comparison of High Change and Low Change Subgroups

Descriptive statistics were calculated for high-change and low-change intervention subgroup participants for the proposed PA correlates (Table 4). Additional analyses were conducted to explore differences between the two intervention subgroups on these variables. No significant differences were noted between the high-change and low-change intervention subgroups regarding any of the variables at baseline. Controlling for baseline scores, the researchers noted that post-intervention mean scores for the high-change intervention subgroup were significantly greater than those for the low-change intervention subgroup for three variables: perceived benefits of PA, $F(1, 37) = 5.37, p = .026$; PA self-efficacy, $F(1, 38) = 5.61, p = .023$; and enjoyment, $F(1, 38) = 7.44, p = .010$. No subgroup differences were found post-intervention for perceived barriers, social support, interpersonal norms, or exposure to models of exercise behavior.

Similar analyses were conducted to note any differences between high-change and low-change control subgroups for PA correlates. Findings indicated no significant differences

between the high-change and low-change subgroups on any of the variables at baseline.

Controlling for baseline scores, the researchers noted that the high-change control subgroup had significantly greater PA self-efficacy, $F(1, 23) = 5.99$, $p = .022$, and lower perceived barriers post-intervention, $F(1,28) = 7.71$, $p = .010$, than the low-change control subgroup.

DISCUSSION

The aim of this study was to develop and test the efficacy of an individually tailored PA intervention for adolescent girls. The computer program with nurse counseling was found to be feasible for use in a primary care setting within a school. Evaluation of the program by intervention group participants indicated that over 95% of the girls would use the program again, as well as recommend the program to their friends. Sixty-three percent of the girls reported that the time spent with the nurse was very helpful.

Patrick and colleagues (2001) reported that a tailored intervention used in outpatient clinics was effective in increasing moderate PA among adolescents. In contrast, in this study, despite encouraging feedback from the girls, no significant differences between the intervention and control groups on any PA measures emerged. However, the fact that 60% of intervention group participants (high-change subgroup) had significantly greater PA difference scores (week 12 post-intervention minus week 1 baseline) than those of the total control group provides impetus for enhancing the robustness of the “Girls on the Move” counseling program. The finding that the high-change intervention subgroup had significantly higher perceived benefits of PA, PA self-efficacy, and enjoyment of PA post-intervention than the remaining 40% (low-change intervention subgroup) is consistent with other studies and lends support to targeting these three constructs in a program to increase PA among adolescent girls (Bungum, Pate, Dowda, & Vincent, 1999; Kientzler, 1999; Trost et al., 1997).

Several factors may have accounted for the lack of significant differences in PA between the intervention and control groups. First, the 12-week intervention period may have been too brief. Recent recommendations concerning adolescents indicate that interventions lasting longer than one semester or 16 weeks are needed to achieve a significant change in deeply entrenched behaviors (Neumark-Sztainer et al., 2003). A gradual process involving several fluctuations in readiness to change behavior may precede actual enactment (Huddleston, 2002; Rimer, 2002).

Second, a small sample size may have precluded the ability to detect significant differences between the groups. Post-hoc power analysis resulted in power of .06 for two-tailed test of group comparison given the sample sizes of 32 in control group and 45 in the intervention group. The largest value obtained in post-hoc power analyses was .15 for comparing stage of change of control and intervention groups at the end of the intervention.

Third, although NPs at both schools reported that they had adhered to training manual protocols, the NPs experienced difficulty counseling some girls who lacked places, resources, and social support for engaging in PA. Forty-six percent of the girls counseled reported that they sometimes, often, or very often did not have anyone to do PAs with them and/or did not have a good place to do PA. Twenty-nine percent of the girls indicated that they did not always have the right equipment, clothes, or shoes. Some girls expressed that their parents/guardians discouraged PA in the home due to noise and low importance placed on being physically active as compared to doing homework or chores. NPs did not record the number of girls experiencing these parent-generated barriers since the study protocol did not specifically indicate that this task be performed.

Although information was mailed home to parents/guardians to encourage them to support their daughter in meeting PA goals, only 50% of the girls in intervention group indicated

that the content had helped their parents/guardians to support their PA. Sixty-two percent of the girls reported that their parents/guardians had read the information, while 9% had a negative response and 29% were not sure. A postage-paid mail-back postcard was not included in the mailings. Returned postcards would have indicated who had received the information. The researchers concluded that direct contact with parents/guardians via a meeting at school and/or a telephone call to explain the PA counseling program may be a more effective approach for increasing parent/guardian support. Tailoring information to emphasize the daughter's unique needs may be another fruitful strategy (provided that the adolescent agrees).

The lack of accessible, safe environments where girls can be active is often overlooked in interventions (Felton, 2002). Experts suggest that creating environments supportive of PA is just as critical as promoting individual behavior change (Marcus & Forsyth, 1999). Increasing interpersonal support and access to equipment and facilities are crucial intervention components since both relate to PA participation (Brownson et al., 2000; Taylor et al., 1999).

NPs providing the counseling received limited training. According to Duran (2003), the effectiveness of interventions to promote health may depend upon the health professional's current knowledge of and expertise in promoting behavior change. Limited perceived competence in providing counseling coupled with perceptions that counseling is futile are barriers to nurses taking a more active role (Moyers, Bugle, & Jackson, 2005). Because state-of-the-art developments in the field of behavior change have received limited attention in the nursing literature, nurses may have difficulty remaining current. To more adequately standardize a counseling intervention and assist health professionals in understanding and applying new insights concerning the nature of change, future research may need to include more in-depth

training (Duran, 2003) and more quality assurance to ensure consistent implementation and participant receipt of all intervention components, including booster sessions.

Finally, the exclusive use of self-reported PA is a limitation of this investigation. Self-report assessments are likely to be less accurate from adolescents than from adults (Welk, Corbin, & Dale, 2000). To enhance the accuracy of results, the researchers recommend that objective measures of PA participation be employed in any future investigations directed at increasing youth PA. If various factors preclude the use of objective measures, giving participants specific advance instructions for monitoring their PAs and a log for recording time and intensity may enhance the accuracy of their future responses to questionnaire items.

Several reasons have been cited for the lack of significant differences between the total intervention and control groups on the PA measures used in this study. However, subgroup differences on the PA correlates have been identified that can inform subsequent studies testing interventions to increase youth PA.

National recommendations call for children and adolescents to engage in at least 60 minutes of PA on most, preferably all, days of the week. (USDHHS and U.S. Department of Agriculture, 2005). Schools are ideal places for influencing factors affecting girls' PA because the majority possess the staff and resources to create a comprehensive and enjoyable program that appeals to girls (Clemmens & Hayman, 2004; Felton, 2002). The researchers are planning to use the "lessons learned" from this study to enhance the "Girls on the Move" counseling program and test the new intervention when combined with a PA Club that provides access to PA opportunities within schools. The ultimate goal of this research program is to develop an effective PA counseling intervention for diverse groups of children and adolescents. Increasing youth PA is a promising approach for decreasing the escalating national overweight epidemic.

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Table 1

Data Collection and Procedures -- Baseline to Post-Intervention

Timeline	Sequence of Events
	Intervention Group (n = 45)
Baseline	Height, weight, and BMI ; Completion of all questionnaires and receipt of tailored feedback messages via computer; 10-minute counseling session with NP; “My Exercise Goals” contract; Receipt of one-page overview of age-specific recommendations for PA participation; Mailed parent tip sheet.
1 week	Phone call or mailed letter (if unable to be reached by phone) focusing on previously agreed upon goals.
3 weeks	Completion of computerized questionnaires targeting perceived PA barriers and self-efficacy and receipt of tailored feedback messages; 10-minute counseling session with NP; Contract renegotiation if necessary; Mailed parent tip sheets.
6 weeks	Phone call or mailed letter (if unable to be reached by phone) focusing on previously agreed upon goals; Mailed parent tip sheet.
9 weeks	Completion of computerized questionnaires targeting perceived PA barriers and self-efficacy and receipt of tailored feedback

(table continues)

messages; 10-minute counseling session with NP; Contract renegotiation if necessary; Mailed parent tip sheets.

12 weeks (post-intervention) Height, weight, and BMI ; Completion of all questionnaires via computer.

Control Group (n = 32)

Baseline Height, weight, and BMI ; Completion of all questionnaires via computer; Receipt of one-page overview of age-specific recommendations for PA participation.

12 weeks (post-intervention) Height, weight, and BMI ; Completion of all questionnaires via computer.

Table 2

Means and Standard Deviations for Characteristics of Girls by Grade in Intervention and Control Groups (N = 77)

Characteristic	6 th Grade		7 th Grade		8 th Grade	
	Control	Intervention	Control	Intervention	Control	Intervention
	School 1	School 2	School 1	School 2	School 1	School 2
	(n = 8)	(n = 22)	(n = 15)	(n = 19)	(n = 9)	(n = 4)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Age	11.25 (.46)	11.45 (.80)	12.27 (.59)	12.37 (.50)	13.44 (.53)	13.00 (.00)
Height	58.19 (3.63)	62.80 (11.91)	62.04 (2.53)	62.28 (2.89)	63.44 (2.11)	63.06 (1.66)
Weight	115.13 (36.52)	119.72 (36.81)	115.83 (31.27)	138.03 (65.54)	141.00 (32.86)	125.63 (24.39)
BMI—Baseline	24.15 (8.22)	22.49 (6.84)	21.04 (4.63)	24.55 (9.89)	24.59 (5.30)	22.26 (4.11)
BMI—Post-intervention	22.70 (5.94)	23.74 (5.59)	20.88 (4.57)	24.56 (9.91)	25.14 (5.58)	22.55 (4.26)

Table 3

Comparison of Intervention and Control Group Physical Activity

Characteristic	Control (n = 32)		Intervention (n = 45)	
	Week 1	Week 12	Week 1	Week 12
	Baseline	Post- Intervention	Baseline	Post- Intervention
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Number of days per week of PA	3.37 (1.26)	4.47 (1.65)	3.07 (1.50)	4.38 (1.43)
Stage of Change	2.38 (.49)	2.91 (1.23)	2.33 (.48)	2.67 (.95)
Number of minutes moderate plus vigorous PA—4 days	126.31 (177.01)	200.66 (205.67)	79.78 (99.22)	192.40 (190.64)
Number of minutes moderate plus vigorous PA—2 weekdays	59.63 (85.27)	121.22 (118.61)	43.09 (62.56)	123.40 (122.97)
Number of minutes moderate plus vigorous PA—2 weekend days	66.69 (127.91)	79.44 (116.56)	36.69 (55.39)	69.00 (92.62)

(table continues)

Number of minutes of moderate plus vigorous PA – yesterday or last weekday	31.41 (48.22)	72.28 (78.45)	32.11 (61.47)	71.16 (75.56)
Number of minutes moderate PA—4 days	86.78 (141.95)	144.66 (139.09)	58.82 (89.13)	131.87 (142.31)
Number of minutes of vigorous PA—4 days	39.53 (70.03)	56.00 (110.47)	20.96 (44.28)	59.09 (74.48)

Table 4

Comparison of High and Low Change Intervention Group Responses

Variable	Low Change Intervention Group (n = 18)		High Change Intervention Group (n = 27)	
	Week 1 Baseline	Week 12 Post- Intervention	Week 1 Baseline	Week 12 Post- Intervention
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Perceived Benefits of PA	4.14 (.47)	3.59 (.59) ^a	3.67 (.95)	3.82 (.69) ^a
Perceived Barriers to PA	2.30 (.71)	2.46 (.57)	2.26 (.63)	2.25 (.62)
PA Self-Efficacy	3.22 (.47)	3.06 (.70) ^b	3.52 (.73)	3.48 (.57) ^b
Enjoyment of PA	3.98 (.51)	3.91 (.69) ^c	4.10 (.73)	4.35 (.45) ^c
	Sum (SD)	Sum (SD)	Sum (SD)	Sum (SD)
Social Support	23.22 (8.72)	23.80 (8.33)	23.33 (10.36)	28.20 (7.35)

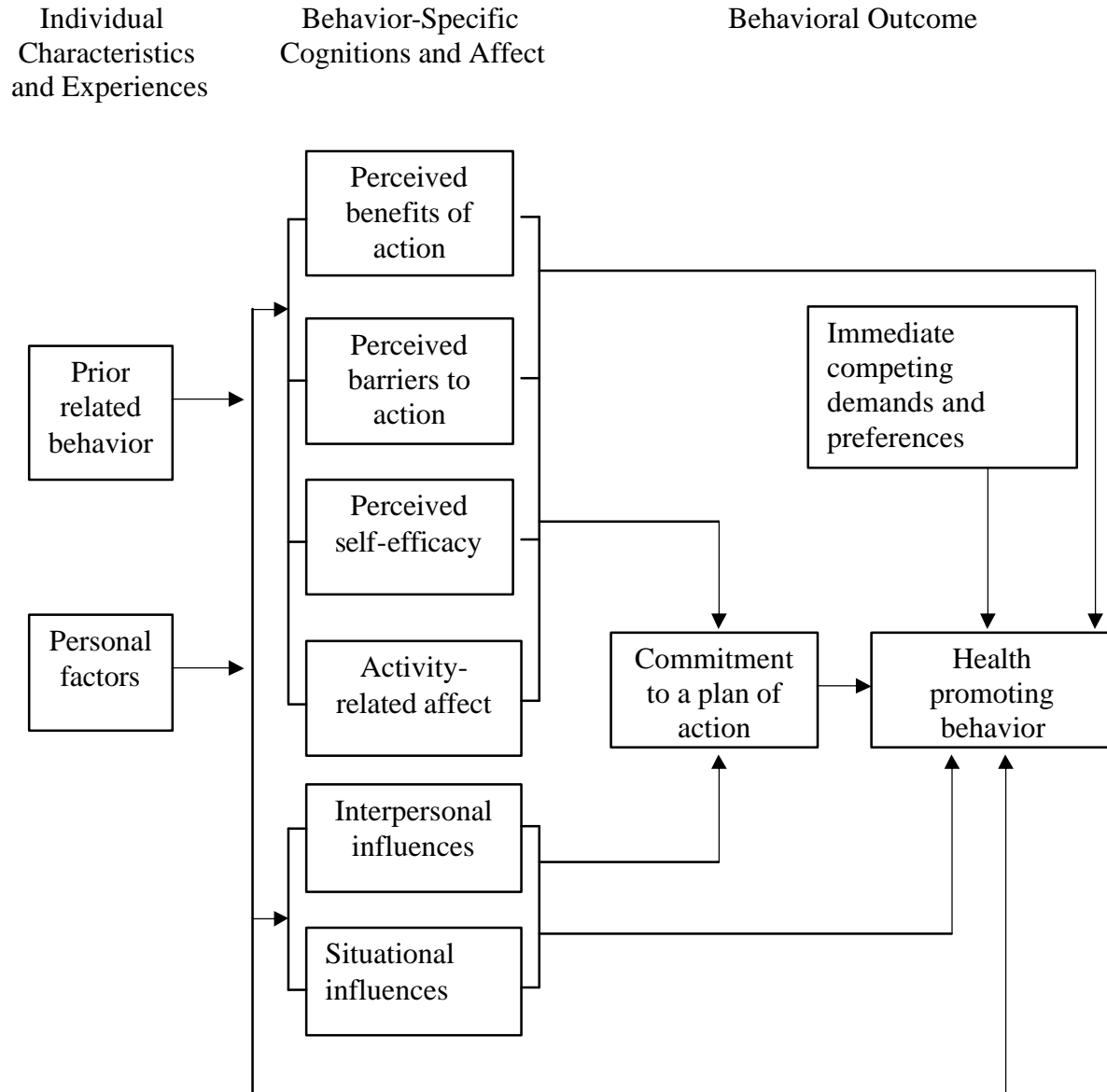
(table continues)

Interpersonal Norms	4.47 (1.07)	4.27 (.88)	3.89 (1.87)	3.71 (1.88)
Exposure to Models of Exercise Behavior	8.71 (4.09)	9.40 (4.17)	6.74 (4.19)	9.64 (4.75)

Significant differences in Week 12 post-intervention when controlling for Week 1:

^a $F(1, 37) = 5.37; p = .026$; ^b $F(1, 38) = 5.61; p = .023$; ^c $F(1, 38) = 7.44; p = .010$.

Figure. Revised Health Promotion Model



From Pender, N. J., Murdaugh, C. L., & Parsons, M.A. (2002). *Health promotion in nursing practice* (4th ed.). Upper Saddle River, NJ: Prentice-Hall.