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Social Support and Peer Norms Scales for Physical Activity in Adolescents

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Abstract

Objectives—To evaluate psychometric properties of a Social Support and Peer Norms Scale in 5th-7th grade urban girls.

Methods—Baseline data from 509 girls and test-retest data from another 94 girls in the Midwestern US were used.

Results—Cronbach's alpha was .83 for the Social Support Scale and .72 for the Peer Norms Scale, whereas test-re-test reliability was .78 for both scales. Exploratory factor analysis suggested a single factor structure for the Social Support Scale, and a 3-factor structure for the Peer Norms Scale. Social support was correlated with accelerometer-measured physical activity ($r = .13$, $p = .006$), and peer norms ($r = .50$, $p < .0001$).

Conclusions—Both scales have adequate psychometric properties.

Keywords

measures; social support; peer norms; physical activity; adolescent; female

Guidelines from the Centers for Disease Control and Prevention (CDC),¹ US Department of Health and Human Resources (USDHHS),² and the World Health Organization (WHO)³ call for children and adolescents to attain at least 60 minutes of moderate to vigorous physical activity (MVPA) each day, but only 16.3% of US adolescents aged 12-17 years achieve this recommendation.⁴ Moreover, physical activity (PA) declines dramatically from

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Human Subjects Statement

The University Biomedical Institutional Review Board approved the conduct of the 2 studies. School and community administrators also provided permission that the study could be conducted in their respective sites.

Conflict of Interest Statement

The authors have no conflict of interest related to the research.

childhood to adolescence.⁵ Girls, especially those residing in urban areas, have lower levels of PA, compared to boys.^{6,7} Regular PA in adolescence helps control weight, build healthy bones and muscles, reduce anxiety and stress, increase self-esteem, and improve blood pressure, blood sugar, cardiovascular fitness, and cholesterol levels.⁸ Therefore, there is a critical need to increase urban adolescent girls' PA to achieve the *Healthy People 2020* objective of increasing the proportion of adolescents meeting daily PA recommendations to 20.2%.⁹

Understanding the correlates of adolescent PA, particularly among urban girls, is essential for designing PA interventions that effectively meet the needs of a specific group. Evidence has been consistent in supporting family social support^{10,11} and peer social support,^{12,13} as significant indicators of adolescents' MVPA. The majority of previous studies use a separate scale to measure adolescents' social support from a specific source, such as a mother, father, sibling, or friend.¹⁴⁻¹⁶ This approach not only increases the participant response burden due to the need to answer multiple measures of social support for PA for each source of support, but also may overlook important sources of social support, such as teachers, coaches, or non-family members. Alternative family situations, such as those involving 2 adults of the same sex (eg, mother and grandmother), require consideration. Moreover, scales including only 3 or 4 items to assess social support for PA may be inadequate for assessing all of the various forms of social support.^{11,12} Given the important impact that multiple forms of social support can have on adolescents' predisposition to PA, a reliable and valid measure of overall social support for PA that includes items addressing both instrumental assistance (eg, provision of transportation) and emotional encouragement (eg, praise), as defined by the Health Promotion Model,¹⁷ is needed to provide an accurate assessment of adolescents' perceptions of the total assistance they receive for PA.

In addition to social support, evidence supports that perceived peers can drive health-promoting behaviors,¹⁸ such as adolescents' PA.¹⁹⁻²¹ Despite the importance of peer norms on PA, only 2 studies were noted that included a scale for measuring adolescents' peer norms for PA.^{19,20} One study used a scale with only one item to measure friends' attitudes or beliefs about PA that mainly addressed acceptance of the behavior: my friends would approve of my being physically active.¹⁹ In the other study, the scale measuring adolescents' peer norms for PA included only 2 items with one measuring beliefs or attitudes and the other assessing prevalence of behavior, but yielded a Cronbach's alpha of only .46.²⁰ Therefore, there is a need for more comprehensive, valid and reliable measures of peer norms for adolescent PA.

Developing comprehensive, yet easy-to-complete measures that are reliable and valid for assessing social support and peer norms is an essential step toward designing effective interventions to promote a physically active lifestyle among adolescents. Therefore, the purpose of this study was 2-fold: (1) to evaluate the psychometric properties of a Social Support and Peer Norms Scale in 5th-7th grade girls living in urban areas; and (2) to examine any correlation between social support and peer norms.

Theoretical Model and Scale Development

The Health Promotion Model¹⁷ was used to guide the scale development and evaluation. The Health Promotion Model underscores the multidimensional influences on healthy behaviors by integrating constructs from Social Cognitive Theory (SCT).²² According to the Health Promotion Model,¹⁷ interpersonal influences, such as social support and peer norms, are related to PA participation. Social support and peer norms may also be correlated with each other.^{17,18} These assumptions were used to examine the validity of the 2 scales. The model¹⁷ defines social support as instrumental assistance and emotional encouragement, and peer norms as individuals' perceptions of their peers' prevalence, beliefs, attitudes, and values related to a behavior.

A 5-item Social Support Scale (items 1-5 in Table 1) was developed previously by the second author to assess instrumental assistance and emotional encouragement received from others.^{17,23} Based on evaluative feedback from focus groups with adolescent girls that followed its development and use in a prior study,²³ minor revisions were made to some items to increase their clarity and 3 items were added (items 6-8 in Table 1) to the original 5-item scale to increase its comprehensiveness and construct validity.

Based on the definition in the Health Promotion Model,¹⁷ norms can be characterized as descriptive or subjective (injunctive). Descriptive norms are the perceptions about the prevalence of others' behavior, whereas subjective norms are the perceptions of others' values or beliefs related to a behavior.²⁴ In this study, "peer norms" were defined as girls' perceptions of their peers' or friends' prevalence of PA (descriptive norms; eg, how many of your close friends do you think exercise most days of the week?); as well as values, attitudes, or beliefs related to the behavior (subjective norms; eg, how important do you think it is to your close friends to be physically active?). Eight items for the Peer Norms Scale (Table 2) were developed by the third author based on the definition in the Health Promotion Model¹⁷ and previous peer norms scales.^{19,20}

METHODS

Study Design

To evaluate the reliability and validity of the Social Support and Peer Norms Scales, we used first-year baseline data collected during September-December 2012 from 5th-7th grade girls in 8 urban schools included in an ongoing group randomized controlled trial (RCT)²⁵ that will ultimately involve a total of 24 Midwestern US schools over 3 intervention years (2012-2015). The protocol for the RCT, the purpose of which is to test a theory-driven, multi-component PA intervention, is reported elsewhere.²⁵ For this study, data were obtained from girls in the 8 schools that completed an iPad-delivered survey measuring their social support and peer norms for PA. Girls received an accelerometer to wear for 7 consecutive days. Girls' height and weight were measured at their respective schools.

To evaluate the test-retest reliability of the scales measuring social support and peer norms, yet minimize the influence of multiple data collections on the efficacy of the PA intervention, an independent test-retest study was conducted with a separate sample of girls.

For the test-retest study conducted in 2013 (July-October), 94 5th-7th urban girls (not involved in the RCT) from one middle school and 2 community centers completed the same iPad-delivered survey initially at Time 1 and again at Time 2, one week after their first assessment. Accelerometer, height, and weight data were not collected from this sample.

Sample and Settings

Selection of schools in the multi-site group RCT was based on 3 inclusion criteria: (1) 50% of students involved in free or reduced-price lunch program; (2) 50% non-white students; and (3) acceptance of school randomization status to intervention or control condition. The average annual family income in the local areas surrounding the selected schools ranged from \$35,931 to \$55,152, compared to the state level of \$68,163.²⁶ The proportion of students involved in the free or reduced-price lunch program ranged from 59.7% to 95.0% (M = 74.0%) in the 8 urban schools.²⁷ On average, 30.3% of the students were white (min-max: 1.2%-49.2%).²⁷ Inclusion criteria for girls participating in the RCT were as follows: (1) enrollment in 5th through 7th grade; (2) available and willing to participate in an afterschool PA club 3 days/week for 17 weeks; (3) available for 9-month follow-up after intervention; and (4) capable of reading, understanding, and speaking English. Exclusion criteria were: (1) involvement in school or community sports or other organized PA after school 3 or more days a week; and (2) having a health condition that prevents or limits engagement in MVPA. Additional details about recruitment are reported elsewhere.²⁵

Girls in the test-retest study were recruited from urban sites, including one middle school and 2 community centers. The average annual family income in the local area surrounding each community center is \$47,230, \$50,224, and \$68,588, compared to \$68,163 in the state and \$74,974 nationally.²⁶ The proportion of the population that is white ranges from 6.8% to 79.0%.²⁶ Girls participating in the test-retest study were: (1) in 5th-7th grade; (2) capable of reading, understanding, and speaking English; and (3) not involved in the ongoing multi-site group RCT.

Measures

Demographics—Single items, adapted from the middle school Youth Risk Behavior Survey²⁸ were used to assess girls' demographic characteristics. Variables of interest were: (1) age; (2) grade; (3) ethnicity; (4) race; and (5) enrollment status with respect to the free or reduced-price lunch program at school. Items were listed on the consent form or a screening tool included with the consent form in a packet of information about the study. In a letter also included in the packet, girls' parents or guardians were asked to complete the items in collaboration with their daughters as needed.

Body mass index (BMI)—BMI was computed from measured height and weight (*weight in kg/height in m²*). Girls' height without shoes was measured to the nearest .10 cm with a Shorr Board (Shorr Productions, Olney, MD), and weight was measured to the nearest .10 kg with a foot-to-foot bioelectric impedance scale (Tanita Corporation, Tokyo, Japan). BMI percentiles and z-scores were estimated using CDC Growth Charts.²⁹

Social support—An 8-item scale including 4 response choices (never = 0, rarely = 1, sometimes = 2, and often = 3) was developed for the group RCT. The response choices were similar to those used in prior work²³ except for the addition of “rarely.” A higher mean score indicates greater social support received for PA.

Immediately after completing the 8-item scale assessing the various forms of social support, girls were asked to identify their sources of social support for PA by responding to the following item: ‘Choose who helps you to exercise, be active, or do sports by doing things for or with you’. Girls were asked to select up to 3 sources of social support for PA from the given list: (1) father; (2) stepfather; (3) mother; (4) stepmother; (5) brother; (6) stepbrother; (7) sister; (8) stepsister; (9) gym teacher, other teacher, or coach; (10) friends or others close to my age; (11) other family member (cousin; uncle or aunt; grandparent); and (12) other non-family member, such as doctor or nurse. This item was modified based on prior work that has been published elsewhere.²³

Peer norms—A 6-item Peer Norms Scale was developed for the group RCT, with a higher total score indicating greater perceived close friends’ prevalence of PA and positive values, attitudes, or beliefs related to the behavior. The scale included 3 components: prevalence of PA (items 1-2 in Table 2), perceived importance of PA (items 3-4 in Table 2), and perceived acceptance of PA (items 5-6 in Table 2). For factor analysis, items 1 and 2, both measuring perceptions of how many close friends engage in PA, were recoded from a 5-point to a 4-point Likert scale as follows: none = 0, a few and some = 1, most = 2, and all = 3. Items 3 and 4 assessed close friends’ perceived importance related to PA with 3 response choices: not at all important = 0, somewhat important = 1.5, and very important = 3. Response choices for items 5 and 6 ranged from disagree a lot = 0 to agree a lot = 3, measuring close friends’ perceived acceptance of PA.

Physical activity—PA was assessed by the Acti-Graph GT3X-plus, a small lightweight accelerometer (www.theActiGraph.com) that has been used for assessing PA in adolescents.³⁰ Counts thresholds used in this study were: sedentary activity (SED) 100 counts/minute; light PA (LPA) > 100 and < 2296 counts/minute; moderate PA (MPA) 2296 and < 4012 counts/minute, and vigorous PA (VPA) 4012 counts/minute.³¹ The average minutes per hour of participating in both light to vigorous PA (LMVPA) and MVPA were estimated from the acceleration counts and used to compute girls’ PA level.

Data Collection Procedures

After approval and permission had been obtained, trained research team members visited the sites, shared information about the study with girls at each site, invited them to participate, answered questions, and distributed recruitment packets to all interested girls. Each packet contained a consent form, an assent form, and a screening tool that included items for determining eligibility based on the inclusion or exclusion criteria. Girls were asked to share the information included in the packets with their parents or guardians and to return the packets in the next day or 2 to the data collectors regardless of their interest in participation. Girls who returned the completed packets immediately received a \$5.00 cash incentive. After receiving parental consent and assent from the girls, data collectors, in collaboration

with school or community administrators, scheduled a time for all girls, including those participating in the group RCT or the test-retest study, to complete the iPad-delivered survey containing the measures of social support and peer norms for PA. Girls in the group RCT received a t-shirt for completing the baseline survey, and girls in the test-retest study received a \$5.00 cash incentive for completing the survey at each time point (Time 1 and Time 2).

For the group RCT, after girls completed the iPad-delivered survey, data collectors trained by the measurement coordinator measured each girl's height and weight in a private location. Then, before receiving the accelerometer, girls watched a 2-minute video instructing them to wear the accelerometer attached to an elastic belt on their right hip from the time they got out of bed to the time they went to bed for 7 consecutive days. In addition, 2 forms (one for parents and one for girls) with instructions on wearing an accelerometer were given to the girls. To remind girls to wear the accelerometers, they received an automated home phone call every morning before school on each weekday and at 11:00 A.M. on each weekend day. Immediately following the 7-day period of wear time, the data collection team returned to each school to collect the accelerometers and download the data into computers. Girls who had 8 hours per day or more of valid data on at least 3 weekdays and one weekend day were given a \$20.00 gift card. Other girls were encouraged to re-wear accelerometers for another 7 consecutive days to receive a \$10.00 gift card. Thirty girls (5.9%) had to re-wear accelerometers for another 7 consecutive days. A total of 462 (90.8%) of the 509 participating girls provided valid accelerometer data.

For the group RCT, 1115 (68.7%) of the 1624 girls who received a packet returned it, and 832 (51.2%) girls agreed to participate in the study. Of the 832 girls, 654 (78.6%) met the inclusion criteria, and 513 (61.7%) were included in the study based on a first come, first served basis. Because 4 girls withdrew due to family relocation to different geographical areas, 509 (99.2%) of the 513 participating girls provided baseline data. For the test-retest study, 109 (55.3%) of 197 girls returned the packet, and 94 (86.2%) agreed to participate in the study. A total of 88 (93.6%) girls completed the surveys at both Time 1 and Time 2.

Data Analysis

We used SPSS 21.0 for analyzing the reliability and validity of the 2 scales. Descriptive statistics (means, standard deviations, frequencies, and percentages) were calculated for all variables. Cronbach's alpha coefficient was calculated to evaluate the internal consistency reliability of the scales. The cutoff value of .30 recommended by Nunnally and Bernstein³² was used to evaluate the item-total correlation coefficients (homogeneity of a scale). The intraclass correlation coefficient (ICC) estimated by a 2-way mixed model with type consistency, ICC (3, k) model^{33,34} was applied to assess the test-retest reliability of the 2 scales. A scale with an ICC < .40, .40-.74, and .75 has poor, fair to good, and excellent test-retest reliability, respectively.³⁵

Exploratory factor analysis (EFA) was performed to examine the factorial compositions of the 2 scales. The correlation matrix of all items was used to assess the singularity and multicollinearity of the baseline data;³⁶ Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (> .50) were applied to decide if a factor

analysis can yield distinct and reliable factors.³⁷ The criteria for number of factors retained in the EFA were: (1) eigenvalue > 1.0; (2) scree plot (elbow: slope of the curve is clearly leveling off); and (3) loading coefficients > .4.³⁸ Criterion-related validity was examined by the Pearson product-moment bivariate correlation with LMVPA and MVPA to test if greater social support or positive peer norms would be associated with higher PA level. In addition, criterion-related validity of the Peer Norms Scale was assessed further by the correlation with the Social Support Scale. Based on the Health Promotion Model,¹⁷ peer norms and social support are expected to have a positive correlation. An independent-samples t-test was performed to examine differences between girls who selected a certain source of support and those who did not in perceived social support and peer norms based on each scale's mean score. Results from the independent-samples t-test were used to assess the divergent construct validity of the 2 scales, which is their capacity to distinguish between 2 different groups.³²

RESULTS

Participants

RCT group—The 509 girls providing baseline data had an average age of 11.76 years (SD = .76, minmax: 10-14) and included 69 (13.6%) in 5th grade, 284 (55.8%) in 6th grade, and 156 (30.6%) in 7th grade. Approximately 13% of the girls were Hispanic (N = 62, 12.8%, 3 missing). Nearly two-thirds of the girls were black (N = 302, 59.3%), 113 (22.2%) were white, and 94 (18.5%) identified themselves as multi-racial. The majority of the girls received the free or reduced-price lunch at school (N = 402, 84.8%, 35 missing). In addition, 109 (21.5%) girls were overweight, 164 (32.3%) were obese, and 5 (1.0%) were underweight.

On average, girls spent 38.24 minutes (SD = 4.39, min-max: 27.58-50.91) per hour on sedentary activity, 21.76 minutes (SD = 4.39, min-max: 9.09-32.42) on LMVPA, and 3.07 minutes (SD = 1.32, min-max: 0.73-8.56) on MVPA. Age was positively correlated to sedentary activity ($r = .25, p < .001$), but negatively correlated with LMVPA ($r = -.25, p < .001$) and MVPA ($r = -.21, p < .001$). Ethnicity, race, and enrollment in the free or reduced-price lunch program had no significant influence on girls' LMVPA or MVPA. MVPA was negatively correlated with girls' BMI ($r = -.12, p = .012$), but not BMI-percentile or BMI z-score.

Test-retest study group—The average age of the 94 girls participating in the test-retest study was 10.81 years (SD = .67, min-max: 9.13-12.42). The girls were in 5th (N = 57, 60.6%), 6th (N = 36, 38.3%), and 7th grade (N = 1, 1.1%). Nearly half of the girls were white (N = 46, 48.9%). Others were Hispanic (N = 20, 21.5%, 1 missing), black (N = 20, 21.3%), or multi-racial (N = 28, 29.8%). More than half of the girls (N = 48, 57.8%, 11 missing) were involved in the free or reduced-price lunch program at school.

Reliability

Social support—For the Social Support Scale completed by the 509 girls, Cronbach's alpha was .84 with item-total correlation coefficients ranging from .50 to .66. Based on the

results of item analysis (Table 1), deletion of items did not result in substantial changes in the Cronbach's alpha value. Therefore, all 8 items were retained. In addition, Cronbach's alpha was .87 for the Time 1 data, and .82 for the Time 2 data in the community sample. The test-retest reliability, assessed by ICC, was .78 for the Social Support Scale with a 95% confident interval (CI) of [.67, .86]. For the sources of social support item, the test-retest reliability coefficients, assessed by ICC, were .82 (father), .90 (stepfather), .76 (mother), .66 (stepmother), .71 (brother), .80 (stepbrother), .84 (sister), .66 (stepsister), .72 (gym teacher, other teacher, or coach), .43 (friends or others close to my age), .62 (other family member such as cousin, uncle or aunt, grandparent), and .63 (other non-family member).

Peer norms—For the 6-item Peer Norms Scale completed by the 509 girls, the standardized Cronbach's alpha was .72 with item-total correlation coefficients ranging from .35 to .56. Based on the results of item analysis (Table 2), deletion of items did not result in substantial changes in the Cronbach's alpha value. Therefore, all the 6 items were retained. In addition, the Cronbach's alphas were .65, .75, and .61 for the prevalence of PA, perceived importance of PA, and perceived acceptance of PA subscale, respectively. In the community sample, the Peer Norms Scale had a standardized Cronbach's alpha of .81 at Time 1 with alpha values being .71, .65, and .54 for the subscales; and .76 at Time 2 with alpha values being .74, .74, and .62 for the 3 subscales. The test-retest reliability, assessed by ICC, was .78 for the Peer Norms Scale with a 95% CI of [.70, .86].

Validity

Social support—The correlation matrix among the 8 items demonstrated that all items were significantly and positively correlated with each other with correlation coefficients ranging from .28 to .55. The determinant of the correlation matrix was .08, $>.0001$. These 2 findings indicated that singularity and multicollinearity were not a problem for the baseline data.³⁶ Results of the Bartlett's test showed significant correlations among the 8 items ($\chi^2_{28} = 1290.02$, $p < .0001$), and the Kaiser-Meyer-Olkin (KMO) measures of sampling adequacy was .88, indicating that factor analysis can yield distinct and reliable factors.³⁷ The principle components analysis without rotation suggested a one-factor structure with eigenvalue of 3.86 (Table 1). The factor loadings for this scale ranged from .62 to .76. The single factor accounted for about 48.2% variance in social support.

Girls' social support mean score ($M = 1.90$, $SD = .69$, $N = 506$) was positively correlated with their accelerometer-measured LMVPA ($r = .12$, $p < .0001$), and MVPA ($r = .13$, $p = .006$), supporting that the Social Support Scale had acceptable criterion-related validity. The majority of girls ($N = 311$, 61.5%) received support for participating in PA from mothers, followed by gym teachers or coaches ($N = 191$, 37.7%), fathers ($N = 162$, 32%), friends ($N = 158$, 31.2%), and sisters ($N = 151$, 29.8%). Girls who received support from mothers had a higher social support mean score than girls who did not receive support from mothers ($M = 2.05$ vs $M = 1.66$, $t_{504} = -6.44$, $p < .0001$). Similarly, girls receiving support from fathers had a higher social support mean score than girls who did not receive support from fathers ($M = 2.03$ vs. $M = 1.84$, $t_{504} = -3.00$, $p = .003$).

Peer norms—The correlation matrix among the items demonstrated that all items were significantly and positively correlated with each other with correlation coefficients ranging from .17 to .60, so singularity was not a problem for the baseline data. Moreover, the determinant of the correlation matrix was .28, $>.0001$, suggesting that multicollinearity is not a concern.³⁶ Bartlett's test results showed significant correlations among the 6 items ($\chi^2_{15} = 644.26$, $p < .0001$), and the KMO measures of sampling adequacy was .69, indicating that factor analysis can yield distinct and reliable factors. Results from the principal components analysis with varimax rotation suggested a 3-factor structure (Table 2). The principal components analysis with a fixed 3-factor structure indicated that the 3 factors accounted for 51.7% of the variance in peer norms: prevalence of PA subscale (16.1%); perceived importance of PA subscale (20.3%); and perceived acceptance of PA subscale (15.3%).

For the RCT girls, the total score of the Peer Norms Scale ($M = 9.98$, $SD = 3.56$, $N = 506$) was not significantly correlated with LMVPA ($r = .06$, $p = .239$) or MVPA ($r = .06$, $p = .183$). However, it was moderately correlated with the mean score of the Social Support Scale ($r = .50$, $p < .0001$). Similarly, the 3 subscales on prevalence, perceived importance, and perceived acceptance of PA for the Peer Norms Scale were not significantly correlated with LMVPA or MVPA, but were significantly correlated with social support with correlation coefficients being .35, .23 and .50, respectively. Moreover, girls who identified friends as a source of social support reported greater positive peer norms than girls who did not receive support from friends ($M = 10.63$ vs. $M = 9.68$, $t_{504} = -2.80$, $p = .005$).

DISCUSSION

This paper aimed to evaluate the psychometric properties of a Social Support and Peer Norms Scale for PA in 5th-7th grade urban girls. Both scales had adequate internal consistency and test-retest reliability. The results from the EFA suggested a single factor structure for the Social Support Scale, and a 3-factor structure for the Peer Norms Scale. The Social Support Scale had good criterion-related validity assessed by the positive correlations with MVPA and LMVPA. Although peer norms were not positively correlated with MVPA or LMVPA, it was moderately correlated with social support, supporting its criterion-related validity. In addition, the Peer Norms Scale was capable of distinguishing differences in peer norms between girls receiving support from friends and those not identifying friends as sources of support.

Obesity prevalence in this study was higher than the national average of 19.1%.³⁹ This larger value was likely due to the sample which was predominantly black, of low socioeconomic status, and of urban residency.⁴⁰ Girls in this study only participated in MVPA for 3 minutes per hour, similar to the national average level.⁴¹ Evidence indicates that ethnicity/race differences in MVPA exist in adolescent boys but not in adolescent girls,^{41,42} consistent with this study's findings. The trend of decreasing MVPA with advancing age is supported by this study as well as previous studies.^{42,43} These findings call for effective interventions to increase MVPA and reduce the high obesity prevalence noted among urban adolescent girls.

Psychometric Properties

The Social Support Scale and Peer Norms Scale for PA, developed for the group RCT, had stronger internal consistency and test-retest reliability compared to previously developed scales.^{20,23} The factorial structures for the 2 scales are consistent with the theoretical framework^{17,44} and the literature on peer norms.²⁴ The criterion-related validity of the Social Support Scale was supported by the significant correlations with PA, but the correlations were weak. This finding may be a result of social support having not only a direct, but also an indirect, effect on PA through mediators, such as motivation, planning, and commitment.^{17,45} Although no significant correlation with PA was found for the Peer Norms Scale, a significant moderate correlation with social support, as implied by the Health Promotion Model,¹⁷ did support its criterion-related validity. Findings that girls who selected friends as a source of social support had greater positive peer norms supported the construct validity of the Peer Norms Scale.

The non-significant correlation between peer norms and PA may have resulted because only about 31% of the girls received support for PA from friends, whereas the majority (62%) received support from their mothers. Also, evidence supports that, compared to boys, girls report significantly more social support and positive norms to be physically active from parents, but significantly less from peers.⁴⁶ Although girls with more active friends report participating in higher levels of PA,⁴⁷ parents, especially mothers, still may play a critical role in shaping their daughters' healthy lifestyle habits. Thus, tailoring PA interventions based on sex is essential. Another contributor to the non-significant correlation between peer norms and PA may be that friends offer less stable or consistent social support for PA compared to other sources. Also, according to Baker et al,¹⁹ peer norms may influence adolescents' attitudes, beliefs, and intentions regarding PA directly, but not their actual PA participation.

Although many previous studies emphasize the important influence of peer social support on adolescents' PA,⁴⁸ this study's findings indicate that 5th-7th grade girls perceive receiving social support for PA primarily from their parents, especially mothers. Similarly, one study with 205 adolescents, aged 12-15 years, examining relationships among self-efficacy, enjoyment, family social support, peer social support, environment, and PA, noted that family social support was the most significant and consistent factor related to both self-reported PA and accelerometer-measured PA for both boys and girls.⁴⁹ Another study with 631 youth, aged 8-18 years, indicated that compared to fathers, girls' PA level was more influenced by their mother's PA level, and this mother-daughter relationship did not decrease with the daughters' increasing age.⁵⁰ Therefore, the influence of mothers on their daughters' PA should be considered when designing a PA intervention for girls.

The young age (11-14 years) of the sample in this study may be one explanation for the finding that girls received social support for PA primarily from parents instead of peers, particularly because research does show that younger adolescents (12.1-14.3 years) receive more family support than older adolescents (14.7-16.5 years).⁵¹ As adolescents mature, they may receive more support from peers instead of parents. Lending some support for this contention. Beets et al¹² found that only peer, but not mother or father, support was related to physical activity among rural high school girls. However, the researchers' use of separate

scale questions for mothers and fathers may have contributed to the non-significant findings for the parents. The findings, including those from this study, imply that parents should be involved in interventions to increase young adolescent girls' PA.

Limitations

This study has several limitations. The sample only included low-active adolescent girls from urban areas, so generalizability of the findings is limited. The small test-retest sample may not adequately represent other groups or the population. Because the test-retest sample differed from the one used for the group RCT in demographics and size, the study findings may differ if tested with other samples. Moreover, girls involved in sports or organized PA after school 3 days a week were excluded, possibly limiting the variability in responses. Testing the scales with girls having varied levels of PA may yield important findings regarding the psychometric properties. Lastly, the items in the Peer Norms Scale had inconsistent response options (eg, some items had 4 response options, some items had 5 response options), which may influence the reliability and validity of the scale. Future studies are needed to evaluate the psychometric properties of the Peer Norms Scale with consistent response options.

Conclusions

The psychometric evaluation of the Social Support Scale and Peer Norms Scale provides evidence of their excellent reliability and validity. This study offers 2 reliable and valid measures that can be employed in future observational and experimental studies focusing on adolescents' PA. Moreover, these 2 measures make measuring mediators possible in future studies that apply the Health Promotion Model or other theoretical frameworks to increase adolescents' PA. Interested professionals can use information gleaned from the 2 measures to design tailored interventions to increase adolescents' PA. Future studies are needed to evaluate the psychometric properties of these 2 scales in other diverse samples involving youth, such as boys, children, and those residing in rural locations.

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Table 1Item and Exploratory Factor Analyses for the Social Support Scale (N = 506^a)

Item	Item Analysis				Factor Analysis	
	M	SD	Item-Total Correlation	Alpha if Item Deleted	LC	Communality
Someone takes me to play sports or exercise.	1.83	.98	.66	.81	.76	.58
Someone exercises or plays active games or sports with me.	2.14	.88	.56	.83	.68	.46
Someone encourages me to exercise.	2.03	.96	.50	.83	.62	.38
Someone watches me exercise, play active games, or do sports.	1.95	.98	.57	.83	.69	.48
Someone congratulates or tells me I am doing well with my exercise, physical activity, or sports.	2.15	.91	.64	.82	.75	.56
Someone plans things to help me be physically active (brings friends over).	1.64	1.04	.57	.83	.69	.48
Someone pays money for physical activities or sports for me.	1.52	1.16	.53	.83	.65	.42
Someone buys clothes or equipment for me so I can be physically active or do sports.	1.94	1.07	.61	.82	.71	.50

Note.

M = mean; SD=standard deviation; LC=loading coefficient

^aThree girls did not compete the Social Support Scale

Table 2Item and Exploratory Factor Analyses for the Peer Norms Scale (N = 506^a)

Item	Item Analysis				Factor Analysis			
	M	SD	Item-Total Correlation	Alpha if Item Deleted	Prevalence (LC)	Importance (LC)	Acceptance (LC)	Communality
How many of your close friends do you think exercise most days of the week?	1.89	1.09	.52	.63	.70	.13	.24	.56
How many of your close friends would you say are physically active?	2.32	1.11	.42	.67	.59	.15	.13	.39
How important do you think it is to your close friends to exercise most days of the week?	1.29	.58	.42	.68	.16	.72	.16	.56
How important do you think it is to your close friends to be physically active?	1.37	.57	.43	.67	.15	.78	.15	.65
My friends encourage me to be physically active.	1.68	1.04	.56	.61	.26	.24	.69	.60
My friends would disapprove if they saw me just sitting around.	1.42	1.07	.35	.69	.13	.09	.56	.34

Note.

M = mean; SD=standard deviation; LC=loading coefficient

^a =Three girls did not compete the Peer Norms Scale