



Household Support for Physical Activity in Adolescent Girls Living in Primarily Low Socioeconomic Status Neighborhoods

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ABSTRACT

International Journal of Exercise Science 12(5): 811-824, 2019. The purpose of this study was to examine the association between perception of household support and physical activity levels of adolescent girls living in primarily low socioeconomic status (SES) neighborhoods. The sample consisted of thirty-six adolescent girls (N=36; 60% non-Hispanic Black; mean age of 14.6 ± 1.3 [mean ± sd]; median body mass index (BMI) percentile of 90.5 [58.5, 97.0]) living in primarily low socioeconomic status (SES) neighborhoods. Trained researchers measured participants' height and weight, and administered questionnaires to assess perception of household support for physical activity and minutes per day participating in moderate-to-vigorous physical activity (MVPA) (3-Day Physical Activity Recall). Pearson's correlation, controlling for race, age, and BMI, was used to evaluate the association between perception of household support and adolescents' MVPA levels. There were no significant associations between measures of the perception of household support for physical activity and adolescents' MVPA levels. There were significant negative associations between total adult household support for physical activity (r=-0.51; p<.01) with BMI and the support provided by the closest adult in the household (r=-0.55; p<.01) with BMI. These data suggest that support for physical activity in the household for adolescents with higher BMI's may be warranted.

KEY WORDS: Obesity, socioeconomic status, physical activity, body mass index, parental support

INTRODUCTION

Current U.S. physical activity guidelines for youth state children and adolescents ages 6-17 years old should engage in at least 60 minutes of moderate-to-vigorous physical activity (MVPA) per day, 7 days per week (22). Troiano et al. (2008), in an analysis of National Health and Nutrition

Examination Survey (NHANES) objectively measured physical activity data, found that only 3.4-5.4% of adolescent girls (ages 12-19 years) met these physical activity guidelines (31). There is also evidence of disparities in physical activity. Specifically, physical activity levels are lower among girls from low SES households (28), and factors influencing physical activity engagement may vary by SES (16).

There are multiple factors that likely contribute to the lower levels of physical activity experienced by low SES adolescents. Studies have shown that low SES adolescents experience additional unique barriers to engagement in physical activity (16, 24, 28, 35). Barriers to physical activity engagement reported in lower SES adolescents include: greater parental concern about perceived neighborhood and personal safety (7); greater family obligations (16); and lack of access to affordable, proximal, and safe environments (12). However, there are other factors that can improve and increase the amount of time these adolescents spend in physical activity.

In adolescents, parental support for physical activity has been significantly and positively associated with physical activity in 29 out of 40 studies examining reported associations (33). Parental support can be further categorized into intangible forms of support (e.g. parental attitudes towards physical activity, encouragement for physical activity) and tangible forms of support (e.g., transportation to physical activity, financial support for physical activity, etc.) (4, 13). Thus, both tangible and intangible parental support may be important correlates of physical activity in low SES adolescent girls (16, 30). It is not known if the positive association between parental support and adolescent physical activity levels applies more broadly to different household make-ups. Previous studies demonstrated that there are no significant differences in youth physical activity levels between those who receive high levels of support from one parent versus two parents (18). However, there are significant differences in youth physical activity levels between those who receive high levels of support from any parent versus those who do not receive any parental support (4, 8, 15,18).

Given the increase in single-parent and multigenerational households, particularly among lower SES households (6), it is essential to understand whether parental support is associated with physical activity levels of adolescents when examined more broadly as household support, including different household make-ups.

The purpose of this study was to examine associations between physical activity levels of adolescent girls living in primarily low SES neighborhoods and their perception of support for physical activity more broadly as household support, including different household make-ups. This is one of the first studies to apply the established parent support scale originally developed for the Amherst Health and Activity Study more broadly to measure support from any adults in the household (5, 10, 11, 23, 26).

METHODS

Participants

This cross-sectional study was designed to explore potential associations between perception of household support for physical activity and physical activity levels of adolescent girls living in primarily low SES neighborhoods. This was an exploratory study and thus no power calculation was completed. We used a convenience sample with the goal of recruiting N=50. We screened fifty-five individuals for participation and were able to successfully enroll and assess N=36.

We recruited girls between the ages of 13-17 years old, without any psychological or physiological condition that may hinder participation in physical activity. We primarily recruited participants from summer programs in addition to a combination of both low-touch (e.g., flyers, Craigslist, participant registry, mailings) and high-touch (e.g., face-to-face at community events) recruitment strategies. Further, we targeted participants living in primarily low SES neighborhoods by recruiting from low SES neighborhoods (based on zip code and census tract poverty data) and from summer programs that serve low SES communities in the Greater Pittsburgh area.

The initial eligibility screening procedure varied, depending on the method through which interested participants were recruited. When interested participants were recruited through one of the low-touch recruitment methods, they were instructed to call the study number to be screened for initial eligibility. Study staff also screened interested participants on-site either at community-based events or other community sites. Inclusion criteria included: (i) female; (ii) between 13-17 years of age; and (iii) the ability to provide assent and obtain parental consent. Exclusion criteria included: (i) male; (ii) presence of any psychological or physiological condition that may hinder participation in physical activity; (iii) currently pregnant or a parent; or (iv) participation in any other research study that may have affected physical activity patterns or behavior in the previous 12 months.

Protocol

Study assessments occurred at the Physical Activity and Weight Management Research Center at the University of Pittsburgh or at community sites after receiving permission from the site administrator. Procedures were consistent regardless of assessment site. Research staff obtained signed parental consent forms and participant assent prior to beginning any study procedures. For completion of the study assessment, participants were compensated \$15 for their time. All study procedures were approved by the University of Pittsburgh Institutional Review Board.

Sociodemographics: Participants reported their date of birth, race/ethnicity, neighborhood of residence, whether or not they cared for/watched other children in the household, and whether they attended an after-school program or worked outside of the home. Participants also reported how many adults (18 years or older) and children (17 years or younger) lived with them in their household. In addition, they responded to questions about the adult they are

closest to, whether the adult worked outside of the home, and whether the adult is typically home when they get home from school and on the weekends.

Anthropometry: Research staff measured participants' height and weight in a private location. Participants were asked to remove their shoes, jackets, and any other heavy clothing or accessories. Participants' height was measured using a wall-mounted stadiometer at the Physical Activity and Weight Management Research Center or a portable stadiometer (Seca 213; Hamburg, Germany) for on-site assessments. Height was measured to the nearest 0.1 cm. Participants' weight was measured using a calibrated Tanita WB-110A (Arlington Heights, IL) scale for assessments conducted at the Physical Activity and Weight Management Research Center. For assessments conducted at community sites, a portable electronic scale (Seca 869; Hamburg, Germany) was used to measure weight. Weight was measured to the nearest 0.1 kg. Body mass index (BMI) was calculated using the standard equation measured weight in kg divided by height in m² of each participant. BMI percentile score was computed using the 2000 CDC growth charts for girls aged 2-20 years (19).

Physical Activity Variables: The 3-Day Physical Activity Recall (3DPAR) was used to assess participants' daily MVPA. The 3DPAR is a group-based tool and was administered to participants in groups to reduce burden to the participants and community sites (i.e. reduce disruption from regularly scheduled summer program activities). The 3DPAR has been demonstrated to be a valid and reliable measure of physical activity for adolescents (21). In brief, we used a standardized script to administer the 3DPAR and guide participants through the questionnaire. The 3DPAR asked participants to recall the previous 3 days and asks them to break down their day into 30-minute time blocks from 7am-12am. It asked participants to record the activity they were doing for each 30-minute time block and the intensity (i.e., light, moderate hard, and very hard) at which they performed that activity. The standardized script read to participants included a description of intensity, which read: "Light Activities- require little or no movement with slow breathing; Moderate Activities- require some movement and normal breathing; Hard Activities- require a moderate amount of movement and increased breathing; Very Hard Activities- require quick movements and hard breathing (21)." The 3DPAR was scored according to the standard protocol to calculate minutes per day of MVPA(21).

Household Support for Physical Activity: The household support for physical activity questions were adapted from the parent support scale originally developed for the Amherst Health and Activity Study (10). The household support scale used in the present study was a 5-item, 5-point Likert-type scale that asked, "In a typical week how often does the specified adult...": [1] "...do sports or physical activity with you?"; [2] "...watch you participate in physical activity or sports?"; [3] "...take you to a place where you can play sports or participate in physical activity?"; [4] "...tell you physical activity is good for you?"; and [5] "...encourage you to be physically active/play sports?" Participants were asked to circle one of the following responses for each question: never, once, sometimes, almost daily, or daily. Participants completed the 5-item sub-scale for the adult they perceived themselves as being the closest with as well as the other adults living in the household. For each additional adult, the participant was asked to report the adult's gender, age, and relationship to the participant.

Responses from the household support scale were further used to assess two parental support constructs: tangible and intangible support. Three of the questions (e.g., "...do sports or physical activity with you?"; "...watch you participate in physical activity or sports?"; and "...take you to a place where you can play sports or participate in physical activity?") measured tangible support, while the two remaining questions ("...tells you physical activity is good for you?"; and "...encourages you to be physically active/play sports?") measured intangible support.

Household support was measured using three constructs: [1] the adult they perceive themselves as being emotionally closest with in the household; [2] the total number of adults perceived to be providing support in the household; and [3] the total magnitude of support provided by all adults in the household. Support from the adult they perceive themselves as being emotionally closest with in the household refers to the support score from the adult identified by participant response to the question: "Think about the adult (18 or older) that you are closest to in your household. Please circle their gender and list their relationship to you." The total number of adults perceived to be providing support in the household was measured by the number of adults in the household who were indicated in providing support at least once over the past week (maximum score is the total number of adults in the household). Total magnitude of support provided by all adults in the household is the sum of reported support from each adult in the household. Each construct was further broken down to reflect: [1] total support (sum of tangible and intangible support scores); [2] tangible support; and [3] intangible support.

Statistical Analysis

All data were analyzed using SPSS Version 24.0 (Armonk, NY: IBM Corp). The following variables were normally distributed: moderate-to-vigorous physical activity, age, and household support measures. Measures with non-normal distributions included: BMI and BMI percentile. Descriptive characteristics were presented as mean \pm sd for normally distributed data, median (25th, 75th percentile) for non-normally distributed data, and categorical variables including race/ethnicity and neighborhood were computed as frequencies.

To address the primary aims of this study, Pearson's correlation was used to determine significant associations between variables. For the Pearson's correlation, non-normal data were transformed using the natural log to correct for normality and the transformed variable was used in the models. Subsequently, Pearson's correlation was used to evaluate the association between adolescents' MVPA and: [1] the adult they perceive themselves as being emotionally closest with in the household; [2] the total number of adults perceived to be providing support in the household; and [3] the total magnitude of support provided by all adults in the household and physical activity levels. In our analysis, we controlled for BMI (17), race (25), and age (9), which may be potential confounders in physical activity levels. In addition, exploratory analyses (Pearson's correlation) were conducted to examine associations between BMI and the household support measures.

RESULTS

Thirty-six participants provided assent and written informed parental consent and completed the assessment. Reasons reported for declining study participation included low perceived financial incentive and failure to obtain required parental consent.

Participants had a mean age of 14.6 ± 1.3 [mean ± sd] years (Table 1). Participants were 60.0% non-Hispanic Black, 20.0% mixed race, and 17.1% non-Hispanic White. Participants were primarily (55.5%; n=20) from neighborhoods in the Greater Pittsburgh area that included more than 30% of residents at or below the federal poverty level (household income <\$24,250 for a family of four). Participants reported engaging in a mean of 160.3 ± 79.3 minutes of MVPA per day, had a median BMI of 26.5 [20.8, 30.8] kg/m², and a median BMI percentile of 90.5 [58.5, 97.0]. The majority of participants (69.4%; n=25) had at least two adults (≥ 18 years), 36.1% (n=13) had three or four adults, and 30.6% (n=11) had only one adult living in their household. Nearly 67% (n=24) of participants had one or more children living with them in their household, with one household having 7 other children present.

Table 1. Demographic and household characteristics of participants (N=36).

Characteristics	
Age (yrs)	14.6 ± 1.3
Grade in School	9.0 [7.0, 10.0]
Race/Ethnicity (%):	
White	6 (17.1)
Black	21 (60.0)
American Indian	1 (2.8)
Other/ Mixed Race	7 (20.0)
Neighborhood of Residence (% of residents at or below federal poverty level):	
> 40	11 (30.5)
30-39.9	9 (25.0)
20-29.9	9 (25.0)
<20	5 (14.9)
Data not available	1 (2.8)
Physical Activity (mins/day) :	
Moderate-to-Vigorous Physical Activity	160.3 ± 79.3
BMI (kg/m²)	26.5 [20.8, 30.8]
BMI Percentile	90.5 [58.5, 97.0]
Number of Adults (≥ 18 years) in the Household:	
One	11 (30.6)
Two	12 (33.3)
Three or more	13 (36.4)
Number of Additional Children (< 18 years) in the Household:	
Zero	12 (33.3)
One	10 (27.8)
Two	5 (13.9)
Three or more	10 (27.8)

NOTE: Normal data are presented as means ± sd; non-normal data are presented as median [25th percentile, 75th percentile], or N (%).

Household support characteristics are presented in Table 2. The majority of participants (72.2%; n=26) named their mother as the person they perceived themselves to be closest with. Only 5.6% (n=2) named their father and 11.2% (n=4) named an older sibling as the adult in their household that they are closest with. All participants (N=36) reported receiving intangible support for physical activity from at least one adult in their household at least one time per week. However, 19.4% (n=7) of participants reported receiving no tangible support for physical activity from any adult in their household.

Table 2. Household perception of support by participants (N=36).

Characteristic	
Closest Adult*:	
Mother	26 (72.2)
Father	2 (5.6)
Mom's Partner	1 (2.8)
Dad's Partner	2 (5.6)
Grandma	1 (2.8)
Brother	2 (5.6)
Sister	2 (5.6)
Closest Adult Providing Support†:	
Total support‡	10.6 ± 4.0
Tangible Support	4.6 ± 3.2
Intangible Support	5.9 ± 1.7
Number of Adults (≥ 18 years) in the Household Providing Support:	
<i>Total support‡:</i>	
Zero	0 (0.0)
One	11 (30.6)
Two	14 (38.9)
Three or more	11 (30.6)
<i>Tangible Support:</i>	
Zero	7 (19.4)
One	6 (16.7)
Two	12 (33.3)
Three or more	11 (30.6)
<i>Intangible Support:</i>	
Zero	0 (0.0)
One	11 (30.6)
Two	16 (44.4)
Three or more	9 (25.0)
Total Magnitude of Support‡:	
Total support‡	21.6 ± 12.4
Tangible Support	9.8 ± 7.4
Intangible Support	11.8 ± 6.0

NOTE: Normal data are presented as means ± sd; non-normal data are presented as mean median [25th percentile, 75th percentile], or N(%). †Closest adult refers to participant response to the question, "Think about the adult (18 or older) that you are closest to in your household. Please circle their gender and list their relationship to you." For closest adult, max total support score is 20; max tangible support score is 12; max intangible support score is 8. ‡Total support is the sum of reported tangible and intangible support. †Total magnitude of household support is the sum of reported tangible and intangible support from all adults in the household combined.

There were positive, non-significant partial correlations (adjusted for age, BMI, and race/ethnicity) between perception of total support ($r=0.22$), tangible support ($r=0.13$), and intangible support ($r=0.25$) for physical activity from the adult in the household they perceived themselves as being the closest with and MVPA (Table 3). Partial correlations were non-significant between the number of adults perceived providing total support ($r=-0.03$), tangible support ($r=0.00$), and intangible support ($r=-0.17$) and MVPA. Finally, partial correlations were negative, but non-significant, between the perception of the total magnitude of total support ($r=-0.06$), tangible support ($r=-0.05$), and intangible support ($r=-0.05$) and MVPA.

Table 3. Association between different measures of perception of household support and moderate-to-vigorous physical activity (N=36).

		Pearson Correlation	p-value	Partial Correlation	p-value
HOUSEHOLD SUPPORT FOR PHYSICAL ACTIVITY					
Closest Adult in the Household†	Total support‡	0.13	0.46	0.22	0.22
	Tangible Support	0.06	0.75	0.13	0.49
	Intangible Support	0.20	0.26	0.25	0.17
Number of Adults in the Household Providing Support	Total support‡	-0.06	0.74	-0.03	0.88
	Tangible Support	-0.03	0.88	0.00	0.99
	Intangible Support	-0.20	0.26	-0.17	0.35
Total Magnitude of Support from the Household‡	Total support‡	-0.10	0.57	-0.06	0.76
	Tangible Support	-0.09	0.61	-0.05	0.77
	Intangible Support	-0.09	0.59	-0.05	0.79

NOTE: Partial correlations adjusted for age, BMI, and race/ethnicity; †Closest adult refers to participant response to the question, "Think about the adult (18 or older) that you are closest to in your household. Please circle their gender and list their relationship to you." ‡Total support is the sum of reported tangible and intangible support. ‡Total magnitude of household support is the sum of reported tangible and intangible support from all adults in the household combined.

Table 4 presents the associations between the household support measures and MVPA with BMI. There were significant negative correlations between most measures of household support and BMI, adjusted for age and race/ethnicity. Specifically: [1] support from the closest adult in the household ($r=-0.52$; $p<.01$); [2] tangible support from the closest adult in the household ($r=-0.52$; $p<.01$); [3] the total magnitude of support from the adults in the household ($r=-0.50$; $p<.01$); [4] the total magnitude of tangible support from the adults in the household ($r=-0.49$; $p<.01$); and [5] the total magnitude of intangible support from the adults in the household ($r=-0.43$; $p=.01$) was associated with BMI. However, there were no significant associations between MVPA and BMI.

Table 4. Correlations between household support measures and physical activity and BMI (N=36).

		Pearson Correlation	p-value	Partial Correlation	p-value
HOUSEHOLD SUPPORT FOR PHYSICAL ACTIVITY					
Closest Adult in the Household [†]	<i>Total support</i> [‡]	-0.55	<0.01	-0.52	<0.01
	<i>Tangible Support</i>	-0.55	<0.01	-0.52	<0.01
	<i>Intangible Support</i>	-0.28	0.10	-0.26	0.15
Number of Adults in the Household Providing Support	<i>Total support</i> [‡]	-0.31	0.07	-0.31	0.08
	<i>Tangible Support</i>	-0.32	0.06	-0.30	0.09
	<i>Intangible Support</i>	-0.31	0.07	-0.33	0.06
Total Magnitude of Support from the Household [‡]	<i>Total support</i> [‡]	-0.51	<0.01	-0.50	<0.01
	<i>Tangible Support</i>	-0.52	<0.01	-0.49	<0.01
	<i>Intangible Support</i>	-0.42	0.01	-0.43	0.01
PHYSICAL ACTIVITY					
<i>Moderate-to-vigorous (min/day)</i>		0.10	0.58	0.10	0.59

NOTE: Partial correlations adjusted for age, BMI, and race/ethnicity; [†]Closest adult refers to participant response to the question, “Think about the adult (18 or older) that you are closest to in your household. Please circle their gender and list their relationship to you.” [‡]Total support is the sum of reported tangible and intangible support. [‡]Total magnitude of household support is the sum of reported tangible and intangible support from all adults in the household combined.

DISCUSSION

This study examined measures of household support for physical activity in a sample of adolescent girls living in primarily low SES neighborhoods. It is possible that we were unable to detect significant associations between household support and physical activity because it was attenuated by other physical activity barriers unique to this population. In a qualitative study by Humbert et al., which assessed the factors that influence physical activity among high and low SES adolescents, low SES adolescents described barriers to physical activity including: family obligations, proximity to recreational opportunities, cost, safety, and facilities (16). It is possible that in our study, household support for physical activity was not enough to increase girls’ physical activity given other environmental barriers.

Household support measures were normally distributed, which indicated that there was a wide range of household support for physical activity among participants. We found no significant association between any measure of household support and girls’ physical activity levels. This is in contrast to prior studies in adolescents that have indicated that if at least one parent provided encouragement to their child related to physical activity, they were significantly more physically active than those who did not receive any encouragement (4, 18).

It is important to note that our sample reported high levels of physical activity. Specifically, the mean physical activity level reported by participants was 160.3 ± 79.3 minutes/day of MVPA. Based on these self-reported responses, more than 75% of the study sample was meeting the US guidelines of 60 minutes of MVPA per day. This is in contrast to previous literature measuring physical activity both objectively (Belcher et al, [33 mins/day]; Troiano et al, [24.6 mins/day]) and subjectively (Hallal et al, [80.3% not meeting guidelines]; Song et al, [14.7% met guidelines]) in youth of this age (3, 14, 27, 31). It is possible that because the majority of assessments (75% [n=27]) occurred during the summer, and most of the girls assessed were recruited from structured summer programs, contributed to the high levels of physical activity reported. Further, it is possible active transport was contributing to the high levels of activity reported by the sample, but this was not directly assessed in the current study.

Additionally, while the 3DPAR has been shown to be a valid and reliable instrument to measure physical activity levels in an adolescent population (21, 32), it still relies on self-report and recalling all activities over the past three days. We observed during administration of the 3DPAR that many participants found it challenging to recall the activities they engaged in over the past three days. They also had difficulty assigning an intensity to the activity, which may have led to higher level of reported time in MVPA. A study by Bauer et al used the 3DPAR to measure MVPA in a lower SES population and was able to detect a significant association between familial support for physical activity and physical activity levels of adolescent girls (2). However, the study by Bauer et al did not provide the quantification of MVPA calculated from the 3DPAR (2), so it is possible that the 3DPAR is not an appropriate tool to quantify minutes/day of moderate-to-vigorous activity in an adolescent population.

Through additional analyses examining perceived household support for physical activity and BMI we found a significant negative association between both the total magnitude of household support for physical activity and total support (both tangible and intangible) for physical activity and BMI. Our findings confirm and extend findings of previous studies examining associations between BMI and support for physical activity (29, 34). One qualitative study by Alm et al, identified lack of family support as a barrier to physical activity in overweight adolescents of low SES (1). Our findings confirm and extend these findings by measuring both support for physical activity and physical activity levels of adolescent girls living in primarily low SES neighborhoods. Similar to previous studies (17, 20), we found no significant association between physical activity levels and BMI.

Strengths and limitations: This study had a number of strengths that included: 1) underserved sample of adolescent girls living in primarily low SES neighborhoods; 2) novel examination of three different measures of household support for physical activity (support from closest adult, number of adults providing support, and total magnitude); and 3) overall makeup of the household that extended beyond the traditional nuclear family (parents, grandparents, siblings, etc.).

This study also had a number of limitations that may have influenced the findings of this study as well as the generalizability of this study. This study aimed to recruit low SES adolescent girls;

however, we did not directly measure SES (e.g., parent education, household income). Thus, it is possible that the sample contained a mixture of low, median or high SES households. However, because we recruited from organizations serving underrepresented youth, we are more confident that the sample is drawn primarily from low SES neighborhoods. Nevertheless, due to this recruitment approach, the majority of participants were recruited from these community programs. While these programs were not physical activity-based, they may have incorporated physical activity as part of their daily program, which may have increased participant physical activity and therefore the current sample might not be representative of all adolescent girls primarily from low SES neighborhoods. Further, it is possible that we were not able to detect potential associations between key variables due to the self-report measure of physical activity. We did not control for the number of weekend and weekdays included participants' reported activity from the 3DPAR, which could have over or underestimated the reported minutes of physical activity. Lastly, it must also be considered that the relatively small sample size and potential lack of statistical power may have prevented us from detecting significance. Future studies should examine the potential association between household support and physical activity levels in a larger sample of adolescent girls using objective measurement of MVPA and SES.

Conclusions: We were unable to detect an association between measures of household support and physical activity levels of adolescent girls living in primarily low SES households. Our analyses did reveal a significant inverse association between household support for physical activity and BMI. Adolescents living in primarily low SES neighborhoods with overweight or obesity are a particularly vulnerable population, who need effective behavioral interventions to reduce weight status and increase physical activity.

ACKNOWLEDGEMENTS

This study was funded by a grant for graduate students through the School of Education at the University of Pittsburgh. The preliminary analyses from this paper were presented at the Annual Meeting of the American College of Sports Medicine in June, 2017. We would like to thank the Community Research Advisory Board (CRAB) and the Clinical & Translational Science Institute (CTSI Registry) for assistance with recruitment. Additionally, we would like to thank our local community partners in the Greater Pittsburgh area for their support in recruitment and assessment efforts. Finally, we would like to thank Dr. Stephanie McCoy, Dr. Andrea Stewart, and Dr. Anna Peluso for their assistance with recruitment and assessments.

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