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Sources and Types of Social Support for Physical Activity Perceived by Fifth to Eighth Grade Girls

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Abstract

Background—Information is lacking on forms and sources of social support for physical activity (PA) received by adolescent girls during various pubertal stages. Two study purposes were to (a) identify the sources and forms of social support for PA perceived by adolescent girls, and (b) examine associations of pubertal stage and social support with PA.

Methods—A secondary analysis of data from a randomized trial was conducted. Fifth through eighth grade girls ($N = 1,519$) completed surveys on social support for PA and pubertal stage and wore an accelerometer.

Results—Girls in early-middle and late-post puberty most frequently received social support from their mothers. A higher proportion of girls in late-post puberty, compared to early-middle puberty, received social support from nonfamily adults (4.2% vs. 3.0%, $p = .019$). Girls identifying three sources participated in more moderate-to-vigorous PA than those having fewer sources ($t_{1,512} = -3.57, p < .001$). Various forms of social support, except for encouragement, were positively related to moderate-to-vigorous PA. Girls in early-middle puberty reported greater social support than those in late-post puberty ($t_{1,512} = 3.99, p < .001$). Social support was positively associated with moderate-to-vigorous PA, while girls in late-post puberty had lower moderate-to-vigorous PA than those in early-middle puberty.

Conclusions—Mothers are important sources of social support for PA. Having more than two sources may result in greater PA. Encouraging girls to increase their PA may not be sufficient.

Clinical Relevance—Efforts are needed from health professionals to prevent any decline in social support for PA as girls advance across adolescence.

Keywords

Adolescent; exercise; female; friend; parent; peer; puberty

Despite World Health Organization (WHO, 2011) recommendations calling for children and adolescents 5 to 17 years of age to attain at least 60 min of moderate-to-vigorous physical activity (PA) per day, disparities in girls' PA are evident. Worldwide, greater than 80% of adolescents 13 to 15 years of age do not meet the WHO PA recommendation, and girls are usually less active than boys (Hallal et al., 2012). In the United Kingdom, Black girls 11 to 13 years of age are significantly more likely than their male counterparts to report no PA during the past week (Curry, Dagkas, & Wilson, 2017). In the United States, more White (19.5%) than Black (16.6%) high school girls meet the recommendations (Kann et al., 2016). Among 12- to 17-year-olds, the proportion is 13.7% for those below the U.S. Department of Health and Human Services poverty threshold (Song, Carroll, & Fulton, 2013). To reduce the disparities, research with girls of minority or low socioeconomic status (SES) is warranted.

Girls' PA declines sharply from ages 9 to 12 years, but whether pubertal development has an effect on girls' PA is less clear (Dumith, Gigante, Domingues, & Kohl, 2011). Some studies noted no influence of pubertal development on PA (Finne, Bucksch, Lampert, & Kolip, 2011; Knowles, Niven, Fawkner, & Henretty, 2009), whereas others indicated early-maturing girls are either less active (Smart et al., 2012) or more active than those who mature later (Fawkner, Henretty, Knowles, Nevill, & Niven, 2014). No definitive explanation exists for the inconsistencies, indicating a need for continued research.

To understand reasons for the decline in PA among girls as age increases (Dumith et al., 2011), researchers have also examined psychosocial factors, such as social support (Laird, Fawkner, Kelly, McNamee, & Niven, 2016). Jackson and colleagues (2013) noted a negative correlation between pubertal development and parental social support for PA among British adolescent girls. Whether relationships among pubertal development and social support for PA are similar for other adolescent girls warrants investigation because of the potential negative impact on their PA. Studies that examine social support and PA in large, urban, multiracial or ethnic adolescent populations are particularly needed (Gill et al., 2017).

Although adolescent girls may receive social support for PA from a variety of sources, research has mainly focused on social support received by adolescents from parents (Laird et al., 2016), peers or friends (Garcia et al., 2016), and family members (Edwardson, Gorely, Musson, Duncombe, & Sandford, 2014). These studies do not capture social support received from nonfamily members, such as teachers and coaches or instructors (e.g., dance; Laird et al., 2016). Little is known about whether the number of sources of support is related to adolescent girls' PA (Laird et al., 2016). Given society's varied social networks, acquiring information on sources of social support perceived by girls as helping to increase their PA, particularly during various stages of pubertal development, is important for guiding intervention development.

Besides its various sources, social support is described as being in two categories: instrumental and emotional. The former category comprises forms that directly facilitate adolescents' PA, such as transporting, paying fees, planning for PA, purchasing equipment, and performing PA with them; whereas the latter category includes indirect forms, such as encouragement and praise for PA (Siceloff, Wilson, & Van Horn, 2014). Whether specific forms of social support are related to adolescent girls' PA and their pubertal stage is unclear.

Understanding the relationship among pubertal stage, social support, and PA can assist nurses in tailoring interventions to meet girls' social support needs as they progress across adolescence. To contribute toward filling current gaps in knowledge, this study's twofold purpose is to (a) identify the sources and forms of social support for PA perceived by adolescent girls; and (b) examine associations of pubertal stage and social support with PA.

Methods

Research Design and Setting

This study involved a secondary analysis of data obtained during baseline data collection in the fall of three intervention years (2012, 2013, and 2014) of a 5-year school-based group randomized controlled trial (RCT; 2011–2016). The main purpose of the trial, including 24 schools in racially diverse urban areas of low SES in the Midwestern United States, was to evaluate the effect of a 17-week intervention on girls' moderate-to-vigorous PA. The group RCT was based on the Health Promotion Model, which purports that various personal factors and certain modifiable variables, such as social support, influence PA (Pender, Murdaugh, & Parsons, 2015).

Participants

A total of 1,519 fifth through eighth grade girls provided data for the RCT and this study. Girls were included if they met the following criteria: (a) in the fifth through seventh grade; (b) willing and available to participate in an after-school PA club 3 days per week for 17 weeks; (c) available for 9-month postintervention follow-up; (d) agreement with random assignment of the school; and (e) able to read, understand, and speak English. Exclusion criteria included: (a) involvement in organized sports or programs including moderate-to-vigorous PA 3 or more days per week after school; and (b) having a health condition preventing PA participation. The sample size was based on power calculations for the group RCT that have been reported previously.

Measures

Demographics—A parental or guardian response of “yes” to a consent form item asking whether their daughter was in the free or reduced-price school lunch program indicated low SES. Parents or guardians also reported their daughter's age, academic grade, race, and ethnicity.

Pubertal stage—The Pubertal Development Scale was used to determine pubertal stage (Petersen, Crockett, Richards, & Boxer, 1988). Girls reported their growth spurt, body hair, skin changes, and breast growth by selecting from four response choices: *no* (1); *yes, barely*

(2); *yes, definitely* (3); or *development complete* (4). They indicated whether menarche had started by responding to another item with *yes* (1) or *no* (4). Response choices for the five items were averaged for each girl to form a continuous variable. Pubertal stage was also determined categorically by summing the following scores for body hair (underarm) growth and breast development and noting whether or not menarche had occurred: prepuberty = 2 and no menarche; early puberty = 3 and no menarche; middle puberty = >3 and no menarche; late puberty = 7 and menarche; and postpuberty = 8 and menarche. The scale has acceptable reliability (Cronbach's alphas ranging from .67 to .70) and validity (high correlation of .84 to .87 with pediatrician-rated physical development) in girls as young as those in the fifth grade (Carskadon & Acebo, 1993).

Social support for PA—An 8-item Social Support Scale was used to measure forms of instrumental assistance and emotional encouragement for PA that girls received from others. The scale has good reliability and validity: Cronbach's alpha and test-retest reliability were .83 and .78, respectively; results from exploratory factor analysis suggested a single-factor structure; and social support was significantly correlated with accelerometer-measured PA. Response choices were *never* (0), *rarely* (1), *sometimes* (2), and *often* (3). A higher score indicated more support. In addition, girls selected up to three people who helped them to "exercise, be active, or do sports" from 12 sources: father, stepfather, mother, stepmother, brother, stepbrother, sister, stepsister, teacher or coach, and friends, other family members, and other nonfamily members.

Physical activity—The ActiGraph GT3X-plus accelerometer (www.theActiGraph.com) was used to estimate minutes of moderate-to-vigorous PA per day. PA measured by the GT3X accelerometers is highly correlated with oxygen consumption ($r = .88$), supporting its validity (Hänggi, Phillips, & Rowlands, 2013). A research team member discussed monitor-wearing instructions with each girl at her school. Girls were asked to wear the monitor attached to an elastic belt on the right hip all day for 1 week, except when bathing, swimming, or sleeping at night. During the 7-day wear period, each girl received a daily automated phone call to remind her to wear the monitor. Researchers initialized the monitors and set them to begin data collection at 5:00 a.m. on the day after girls received them. For analysis, moderate-to-vigorous PA was identified as 574 counts/15 s (Evenson, Catellier, Gill, Ondrak, & McMurray, 2008).

Procedure

Approval to conduct the study was obtained from the Michigan State University Institutional Review Board and school administrators. At the beginning of each academic year, two researchers presented an overview of the study at each school, invited girls to participate, distributed information packets to interested girls, and answered questions. Each packet included consent and assent forms and a screening tool including items reflecting inclusion and exclusion criteria. Girls were asked to share information with their parents or guardians and return completed forms the next day. Data collectors girls access an iPad-delivered, Internet-based survey with voice-overs so girls could complete the Social Support Scale. Sitting behind a privacy screen, a researcher assisted each girl with completing the Pubertal Development Scale.

Data Analysis

Among the 1,519 girls participating, 1,514 (99.7%) had some accelerometer data. Missing data were identified as missing at random and imputed via multivariate imputation (Rubin, 1987) by chained equations (van Buuren, 2007). Ten imputations, which were performed at the individual level, were determined to be sufficient (Azur, Stuart, Frangakis, & Leaf, 2011). The average of the imputations was reported as the summary statistics. The imputation model included baseline demographics, social support, and moderate-to-vigorous PA variables.

All analyses were conducted in IBM SPSS Statistics for Windows version 22.0 (IBM Corporation, 2013) and R statistical software version 3.2.4 (R Core Team, 2016). Means, standard deviations, frequencies, and percentages were calculated. A chi-square test was used to examine sources of social support and pubertal stage. Associations among social support, pubertal stage (mean score of five Pubertal Development Scale items), and moderate-to-vigorous PA were evaluated using Pearson product-moment correlation analyses. Independent *t* tests were employed to examine pubertal stage differences in forms of social support and moderate-to-vigorous PA. Linear mixed-effects models were used to examine the association of social support and pubertal stage with moderate-to-vigorous PA. The cluster random effect of school was incorporated via a random intercept for school, while controlling for demographics: age, race (Black or non-Black), SES (enrolled in free or reduced-price school lunch program—yes or no), and ethnicity (Hispanic—yes or no).

Results

Demographic Characteristics

The mean age of the 1,519 girls was 12.05 years ($SD = 1.01$, range 10–15). Most were Black ($n = 756$, 49.8%), in sixth ($n = 584$, 38.4%) or seventh ($n = 573$, 37.7%) grade, and enrolled in the free or reduced-price school lunch program ($n = 1,182$; 83.5%; 103 girls had missing information). Due to only a small number in the pre-, early, and post pubertal categories, the first two were combined with middle puberty, and the third category was merged with late puberty to form two groups: early-middle puberty and late-post puberty. Among the 1,519 girls, 803 (53.1%) were in early-middle puberty, and 710 (46.9%) were in late-post puberty. Black girls were older than White girls and those selecting more than one race (12.17 years vs. 11.86 and 12.01, respectively). A higher percentage of Black girls was in late-post puberty, as compared to White girls and those selecting more than one race (57.6% vs. 20.3%, $p < .001$; 57.6% vs. 22.1%, $p = .004$); a higher percentage of White girls was in early-middle puberty than those selecting more than one race (32.9% vs. 24.0%, $p = .008$). On average, girls participated in 24.42 min of moderate-to-vigorous PA per day. Girls in early-middle puberty had higher minutes of moderate-to-vigorous PA (29.40 vs. 25.17 min, $p < .001$) than those in late-post puberty. Table 1 presents sample characteristics by pubertal stage.

Sources of Social Support

Table 2 shows sources of social support according to pubertal stage. Girls in early-middle puberty reported most frequently receiving support from their mother ($n = 522$, 34.5%),

followed by teacher or coach ($n = 305$, 20.1%), father ($n = 296$, 19.6%), sister ($n = 254$, 16.8%), friend ($n = 214$, 14.1%), and other family member ($n = 206$, 13.6%). Girls in late-post puberty most frequently selected their mother ($n = 420$, 27.8%) and teacher or coach ($n = 243$, 16.1%), followed by sister ($n = 223$, 14.7%), friends ($n = 215$, 14.2%), other family member ($n = 195$, 12.9%), and brother ($n = 194$, 12.8%). Compared to those in early-middle puberty, a lower proportion of girls in late-post puberty identified their mother (34.5% vs. 27.8%, $p = .019$) or father (19.6% vs. 12.0%, $p < .001$). A higher proportion of girls in late-post puberty received support from other nonfamily adults than those in early-middle puberty (4.2% vs. 3.0%, $p = .019$).

Compared to girls selecting one or two sources, girls identifying three engaged in more minutes of moderate-to-vigorous PA per day (40.78 vs. 37.00 min, $t_{1,512} = -3.57$, $p < .001$). Girls who received support from a sister participated in more moderate-to-vigorous PA (42.62 vs. 38.53 min, $t_{1,512} = -4.01$, $p < .001$) than girls who did not receive this support. Social support from a source other than sister resulted in no moderate-to-vigorous PA differences between those receiving and not receiving support from the identified source.

Forms of Social Support

Of the eight scale items reflecting forms of social support, four were negatively correlated with pubertal stage mean score: (a) Someone takes me to play sports or exercise ($r = -.09$, $p < .001$); (b) Someone exercises or plays active games or sports with me ($r = -.11$, $p < .001$); (c) Someone watches me exercise, play active games, or do sports ($r = -.08$, $p < .001$); and (d) Someone congratulates or tells me I am doing well with my exercise, PA, or sports ($r = -.07$, $p < .001$). All but one item (Someone encourages me to exercise) were positively correlated with moderate-to-vigorous PA: (a) Someone takes me to play sports or exercise ($r = .12$, $p < .001$); (b) Someone exercises or plays active games or sports with me ($r = .13$, $p < .001$); (c) Someone watches me exercise, play active games, or do sports ($r = .10$, $p < .001$); (d) Someone congratulates or tells me I am doing well with my exercise, physical activity, or sports ($r = .11$, $p < .001$); (e) Someone plans things to help me be physically active ($r = .10$, $p < .001$); (f) Someone pays money for physical activities or sports for me ($r = .10$, $p < .001$); and (g) Someone buys clothes or equipment for me so I can be physically active ($r = .08$, $p < .001$).

For the total sample, social support was negatively correlated with age ($r = -.14$, $p < .001$) and pubertal stage mean score ($r = -.08$, $p = .003$), and positively correlated with moderate-to-vigorous PA ($r = .14$, $p < .001$). The association between social support and moderate-to-vigorous PA did not differ by pubertal stage. Girls in early-middle puberty reported higher mean levels of social support than girls in late-post puberty (1.91 vs. 1.76, $t_{1,512} = 3.99$, $p < .001$). Pubertal stage mean score was positively correlated with age ($r = .44$, $p < .001$) and negatively correlated with moderate-to-vigorous PA ($r = -.13$, $p < .001$).

Table 3 shows results from the linear mixed-effects model. After controlling for age, ethnicity, race, and SES, as well as the random cluster effect of school, social support was still positively associated with moderate-to-vigorous PA ($B = 0.17$, $p = .002$). Girls in the early-middle puberty participated in 5.79 min per day more of moderate-to-vigorous PA than those in the late-post puberty ($p < .001$).

Discussion

This study examined fifth through eighth grade girls' sources and forms of social support, along with associations among pubertal stage, social support for PA, and accelerometer-measured moderate-to-vigorous PA. White girls were slightly younger than Black girls (11.86 vs. 12.17 years, respectively), but 57.6% of the Black girls were already in late-post puberty, as compared to only 43.1% of the White girls. U.S. data have shown that, on average, Black girls experience menarche earlier than White girls (Chumlea et al., 2003). Of concern is that early menarche increases future disease risk (Britton et al., 2004), which may be amplified among girls who do not attain adequate PA.

The finding that the most common source of social support for PA cited by girls in all pubertal stages was their mother indicates the importance of involving mothers when designing PA interventions for girls. Research supports that Black mothers play an important role in increasing their daughters' PA. Thus, tailoring PA intervention content to address cultural preferences of Black mothers and daughters may promote PA (Alhassan, Greever, Nwaokemeleh, Mendoza, & Barr-Anderson, 2014).

In this study, a greater proportion of girls in early and middle puberty identified immediate family members (mother, father) as sources of social support, compared to girls in later pubertal stages. Consistent with findings of Jackson et al. (2013), social support was positively correlated with PA, and pubertal stage was negatively associated with social support and PA. Perhaps, reduced parental support is contributing to the PA decline across adolescence.

This study's finding that more sources of social support are related to higher moderate-to-vigorous PA was also noted by Davison, Cutting, and Birch (2003), who found only 32% of 9-year-old girls reported a high level of PA when no parent provided support. This proportion increased to 56% when one parent provided support and 70% when both parents provided support (Davison et al., 2003). Other researchers suggest that exposing adolescent girls to multiple sources of support is important to increase their PA (Laird et al., 2016). Oosterhoff, Kaplow, Wray-Lake, and Gallagher (2017) identified continued involvement in organized sports or PAs as one way for adolescent girls to cultivate supportive relationships with several adults and peers who can help the girls increase their PA.

Adolescents younger than 15 years need transportation to places to be physically active (Beets, Vogel, Forlaw, Pitetti, & Cardinal, 2006). Unfortunately, girls' perceived support with regard to transportation decreases as they mature, as indicated by the negative relationship between this form of support and pubertal stage. Even as adolescents become more independent from families as maturity increases, they still rely on parents to gain access to PA opportunities. Unfortunately, income disparities may preclude some parents from providing instrumental support for their adolescents, especially their daughters (Beets, Cardinal, & Alderman, 2010). Assisting parents with transportation issues and helping them find low-cost activity costs or scholarships may be essential for increasing low-income, urban adolescent girls' PA.

The finding that participating in PA with girls was associated with their moderate-to-vigorous PA is consistent with other study results showing that involving friends (Zook, Saksvig, Wu, & Young, 2014), family members (Springer, Kelder, & Hoelscher, 2006), and parents (Crawford et al., 2010) in PA with adolescent girls can increase girls' PA. Unfortunately, parents spend more time on PA with their sons than daughters (Fredricks, Simpkins, Eccles, & Simpkins-Chaput, 2005), indicating a need to involve parents with their daughters in PA interventions. Consistent with this study's results, Duncan, Duncan, and Strycker (2005) found that having family members or peers watch adolescents engage in PA was positively associated with adolescents' PA. Encouraging others to watch girls participate in PA may promote girls' continued engagement in the behavior.

Similar to results reported by Springer et al. (2006), praise was associated with PA, while encouragement was not. The nonsignificant association between encouragement and PA is inconsistent with other studies identifying encouragement as an emotional form of support related to PA (Yao & Rhodes, 2015). As explained by Beets et al. (2010), encouragement may be a precursor to PA participation, while praise may reinforce behavior already being enacted. Regardless, the findings emphasize the importance of praise in promoting PA among girls.

To address disparities in PA noted among adolescent girls of low SES, effective strategies may include transporting; participating in PA with them; watching them engage in PA; providing positive reinforcement; planning PA-related events; and paying for PA fees, clothes, or equipment. Future research is needed to test these strategies to help this vulnerable population overcome their barriers to PA as a means to promote long-term sustainability of the behavior.

This study had strengths and limitations. Use of accelerometers and the large sample of racially diverse girls in low-SES urban areas represent important strengths. However, the study findings cannot be generalized to girls in other environments (e.g., private schools) who may have a different social support network; these girls may have numerous options for involvement on sports teams that provide social support, opportunities to compete at state and national levels, and rewards (e.g., trophies for winning). One study limitation was that girls were allowed to select only a maximum of three sources of social support, as opposed to all of their sources. Although ranking sources of support from most to least helpful would have provided additional information, one of the authors noted, in prior unpublished pilot work, that this age group had difficulty completing the task due to perceptions that some sources provided equivalent support. Family composition was not assessed, so it is not known whether or not a participant selected her mother, for example, as a source of social support because her father was absent. Although PA data were collected immediately after pubertal stage and social support data, a longitudinal investigation may be beneficial for identifying changes in the variable relationships over time.

Conclusions

Nursing interventions may need to involve family members to assist them in helping busy mothers support their adolescent daughters' PA. As girls advance across pubertal stages,

participation in PA programs that foster additional support from teachers and coaches should be encouraged. For adolescent girls of low SES, interventions that offer instrumental support and positive reinforcement may be key for assisting them to attain adequate PA. According to Brown (2009), to increase girls' PA, nurses need to design multifaceted PA interventions that integrate PA-specific cognitive and affective, as well as physical (e.g., increased opportunities for PA), domains. Roy's Adaption Model (Roy & Andrews, 2009) also supports that engaging the mind and spirit, as well as the body, in a PA intervention helps individuals to feel better about themselves (e.g., improves self-esteem or body image) and, as a result, promotes successful adaptation to an active lifestyle (Rogers & Keller, 2009). Cognitive and affective variables, such as those noted in various nursing theories and models (e.g., Health Promotion Model; Pender et al., 2015), that are identified as having a significant effect on PA can be integrated with those of other theories and models to underpin novel interventions to assist girls in increasing their PA. A theory-based approach also allows for the recommended rigorous analysis of proposed mediators in order to determine the most effective combination of factors to target to meet the unique needs of girls to increase their PA (Perry, Garside, Morones, & Hayman, 2012). Nurses interested in conducting programs to increase girls' PA should consider the aforementioned information.

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Clinical Resources

- Office of Disease Prevention and Health Promotion, U.S. Department of Health and Human Services. Physical activity guidelines for Americans. <https://health.gov/paguidelines/guidelines/>
- Office on Women's Health, U.S. Department of Health and Human Services. Fitness. <https://www.girlshealth.gov/fitness/index.html>
- World Health Organization. Physical activity. http://www.who.int/topics/physical_activity/en/

Table 1Characteristics of Girls in Early-Mid and Late-Post Puberty ($N = 1,519^a$)

Variable	Total <i>n</i> (%)	Early-middle puberty <i>n</i> (%)	Late-post puberty <i>n</i> (%)
No. of girls	1,519 (100.0)	803 (53.1)	710 (46.9)
Age (years) *			
10	230 (15.1)	196 (24.4)	32 (4.5)
11	543 (35.7)	371 (46.2)	171 (24.1)
12–14	746 (49.1)	236 (29.4)	507 (71.4)
Academic grade *			
5th	228 (15.0)	193 (24.0)	33 (4.6)
6th	584 (38.4)	399 (49.7)	184 (25.9)
7th	573 (37.7)	198 (24.7)	372 (52.4)
8th	134 (8.8)	13 (1.6)	121 (17.0)
Hispanic ethnicity	201 (14.0)	110 (14.6)	90 (13.4)
Race *			
Black	756 (49.8)	346 (43.1)	409 (57.6)
White	412 (27.1)	264 (32.9)	144 (20.3)
More than one/other	351 (23.1)	193 (24.0)	157 (22.1)
Enrollment in free or reduced-price school lunch program *	1,182 (83.5)	597 (79.5)	581 (87.9)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Moderate-to vigorous PA *	27.42 (13.54)	29.40 (14.11)	25.17 (12.55)

PA, physical activity.

^aTable includes data prior to imputation.* $p < .01$.

Table 2Sources of Social Support by Pubertal Stage ($N = 1,514^a$)

Source of social support	Total <i>n</i> (%)	Early/middle puberty <i>n</i> (%)	Late/postpuberty <i>n</i> (%)
Father ^b	478 (31.6)	296 (19.6)	182 (12.0)
Stepfather	97 (6.4)	49 (3.2)	47 (3.1)
Mother ^c	572 (37.8)	522 (34.5)	420 (27.8)
Stepmother	54 (3.6)	29 (1.9)	25 (1.7)
Brother	388 (25.6)	194 (12.8)	194 (12.8)
Stepbrother	27 (1.8)	15 (1.0)	12 (0.8)
Sister	476 (31.4)	254 (16.8)	223 (14.7)
Stepsister	37 (2.4)	21 (1.4)	17 (1.1)
Teacher/coach	547 (36.1)	305 (20.1)	243 (16.1)
Friend	429 (28.3)	214 (14.1)	215 (14.2)
Other family member	401 (26.5)	206 (13.6)	195 (12.9)
Other nonfamily adult ^c	108 (7.1)	45 (3.0)	63 (4.2)

^aFour girls were excluded from analysis due to no accelerometer data at all.

^b $p < .001$,

^c $p < .05$

Table 3

Linear Mixed-Effects Model of Moderate-to-Vigorous Physical Activity ($N = 1,514^a$)

Variable	Estimate	SE	95% CI	p value	FMI
Intercept	2.44	0.15	(2.15, 2.73)	<.001	0.04
Age	-0.01	0.00	(-0.01, 0.00)	.123	0.02
Hispanic ethnicity (reference: no)	0.00	0.10	(-0.19, 0.19)	.994	0.06
Race: Black (reference: no)	0.38	0.07	(0.24, 0.53)	<.001	0.02
Enrollment in free or reduced-price school lunch program (reference: no)	0.22	0.09	(0.04, 0.40)	.017	0.08
Pubertal stage (reference: early/middle)	-0.45	0.07	(-0.60, -0.31)	<.001	0.02
Social support	0.17	0.05	(0.08, 0.26)	.002	0.02

Note. Boldfacing indicates statistical significance ($p < .05$). Multiple imputations = 10; random cluster effect of school intraclass correlation = 0.02. CI, confidence interval; FMI, fraction of missing information; SE, standard error of the parameter estimate.

^aFive girls without any accelerometer data were excluded.