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## Correlates of Social Support and its Association with Physical Activity Among Young Adolescents

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### Abstract

**Background**—A substantial proportion of adolescents, particularly girls and minority youth, fail to meet daily physical activity (PA) recommendations. Social support contributes to adolescent PA, but studies examining this relationship have yielded inconsistent results and rarely focus on diverse, urban populations.

**Aims**—This study examines the correlates of support for PA from family and friends and its relationship with PA outcomes among young adolescents.

**Methods**—Data were collected in a cross-sectional survey of 4,773 middle school students. Social support from family and friends was separately measured using the Sallis Support for

Exercise Scales. Hierarchical logistic regression models were used to assess correlates of high support and the relationship between support and self-reported PA.

**Results**—Approximately one quarter of students reported being active for at least an hour each day. 31.7% of students reported high family support for PA, while 17.8% reported high friend support. Differences in perceptions of support by gender, ethnicity, and language emerged. Support from family and friends were both consistently strong predictors of all three PA outcomes measured.

**Discussion**—Findings highlight the need for multi-level interventions targeting both psychosocial influences on behavior in addition to addressing the physical environment. Given low rates of friend support for PA, there appears to be an opportunity to increase PA levels through promotion of supportive behaviors among peers.

**Conclusion**—Support for PA from family and friends is a key contributor to increased PA among adolescents. Further research is needed to further understand the mechanisms by which these factors influence PA.

### Keywords

social support; physical activity; adolescent; obesity; health behavior

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## INTRODUCTION

Regular physical activity (PA) supports healthy development (Strong et al., 2005; U.S. Department of Health and Human Services [DHHS], 1996), but a substantial proportion of youth fail to meet the recommended hour of daily PA (Carlson, Densmore, Fulton, Yore, & Kohl III, 2009; Centers for Disease Control and Prevention [CDC] & National Center for Health Statistics [NCHS], 2013; UCLA Center for Health Policy Research, 2013). In California, 84.6% of early adolescents do not engage in 60 minutes of daily PA (UCLA Center for Health Policy Research, 2013). Nationally, only 20.4% of 12–15 year olds report being active outside of school (CDC & NCHS, 2013). Activity levels drop as children grow older (Aarts, Paulussen, & Schaalma, 1997), which contributes to overweight and obesity and increases risk for chronic disease and comorbidities over the life course (Trudeau, Laurencelle, & Shephard, 2004; U.S. DHHS, 1996).

While PA declines overall during adolescence, vulnerable groups exhibit disproportionately lower rates of PA. For example, middle school girls are usually less active than boys (Prochaska, Rodgers, & Sallis, 2002). Children from lower socioeconomic status families also tend to be less active than higher income peers (Sallis et al., 1992). Furthermore, minority and low-income youth generally have fewer opportunities to engage in PA due to limited access to safe spaces for out-of-school recreation (Gordon-Larsen, 2006; Richmond, 2006; Whitt-Glover et al., 2009). A better understanding of correlates of PA can help promote PA among these groups.

Theories of health behavior suggest that both social and environmental factors play a role in shaping PA practices. The interpersonal domain, including family and peer influence on development and behaviors during adolescence, appears to be particularly important. Social

Cognitive Theory (SCT) explains how relationships affect behavior through the reciprocal influence between cognitive, behavioral, and environmental factors (Bandura, 1977). According to SCT, social support processes are a major mechanism through which these factors influence youth PA behaviors (Welk, Wood, & Morss, 2003).

Social support for PA, particularly parent and peer support, has been identified as a determinant of PA (Duncan, Duncan, & Strycker, 2005; Prochaska et al., 2002; Sallis, Prochaska, & Taylor, 2000). Parents and other family members may serve as PA role models and provide emotional and logistical support, such as encouragement, praise, or transportation (Anderssen & Wold, 1992; Duncan et al., 2005; Prochaska et al., 2002). Peers become more influential in adolescence (Prochaska et al., 2002), and support for PA from peers is a consistent predictor of PA across gender and age groups (Beets, Vogel, Forlaw, Pitetti, & Cardinal, 2006; Duncan et al., 2005; Frenn et al., 2005; Prochaska et al., 2002; Robbins, Stommel, & Hamel, 2008; Voorhees et al., 2005). Peers may provide companionship during PA and influence behavior choices through social reinforcement (Voorhees et al., 2005).

Despite theoretical backing and extensive research examining the relationship between social support for PA and participation in PA, inconsistencies have emerged. One study found no association between monitored PA and support for PA from parents or friends among middle schoolers (Prochaska et al., 2002). Some studies found boys report more support (Trost et al., 2003; Welk et al., 2003), while others found less (Higgins, Gaul, Gibbons, & Van Gyn, 2003; Wu, Pender, & Nouredine, 2003) or no gender difference (Garcia et al., 1995). Similarly, studies inconsistently report on the association between perceptions of support for PA and weight status among youth (Beets et al., 2006; De Bourdeaudhuiji et al., 2005; Ward et al., 2006; Zabinski, Saelens, Stein, Hayden-Wade, & Wilfley, 2003). Many of these inconsistencies are due to differences in measures of PA, including self-reported and monitored measures, and differences in measures of social support for PA across studies. In addition, studies including a wide age range of children and adolescents may obscure potential differences in the influence of social support for PA across different developmental stages.

Interpreting research findings on the association between social support and PA must take into account the social context. Studies examining social support and PA rarely focus on large, urban, multi-ethnic populations, which is important given inconsistencies in results of studies examining racial/ethnic differences in social support (Felton et al., 2002; Grieser et al., 2008). Few studies have explored the role of psychosocial factors in influencing PA among Latino youth (Belcher et al., 2010; Byrd-Williams, Kelly, Davis, Spruijt-Metz, & Goran, 2007; Foran, Cermak, & Spruijt-Metz, 2013), which is of public health concern given the high rates of overweight and obesity among Latinos (Ogden, Carroll, Fryar, & Flegal, 2015). This study aims to fill these gaps by examining correlates of family and friend social support for PA and the relationship with PA among a large sample of middle school youth from a diverse, urban school district with a large proportion of Latino students.

## METHODS

### Participants and Survey Administration

Data were collected in a cross-sectional survey of 4,773 seventh-grade students recruited from 16 middle schools in a large district in Los Angeles, California. The district has a total of 190 schools that include grades 6–8. Schools were identified by their willingness to participate in a physical education (PE) intervention study and level of enrollment in the National School Lunch and Breakfast Programs. Across all schools, an average of 73.8% of students participated in these programs, which is similar to the district-wide participation rate of 75.6%. Seventh-grade students at all study schools were offered the opportunity to participate in the survey during their PE class prior to any intervention activities during the fall of 2014. Of the 6,201 seventh-grade students at all 16 schools, 5,529 students were enrolled in participating teachers' classes (89.2%), and 4,773 students completed the survey (77.0%).

This study was approved by the University Institutional Review Board and the school district. Parents were informed through an information sheet distributed to students by the research team. Parents were able to opt their children out of the survey, and students provided verbal assent to participate. Prior to data collection, members of the research team explained the study to students and informed them that participation was voluntary and had no effect on academic grades. The research team remained in the room to answer questions during survey administration.

### Instrument and Measures

The survey instrument included items developed by the research team and items adapted and adopted from existing youth surveys (CDC, n.d.; Sallis, 2002). The instrument was pre-tested with a group of sixth-grade students, followed by revisions to ensure appropriate reading level. The revised survey was again pre-tested with a group of seventh-grade students.

**Social Support**—Perceived family and friend support for PA was measured using the family and friend participation subscales of the Sallis Support for Exercise Scales (Sallis, Grossman, Pinski, Patterson, & Nader, 1987). Students responded to 10 items related to support provided by family or members of the household and 10 items concerning support from friends or classmates. Family support items asked about encouragement (e.g. “My family or a member of my household gave me helpful reminders to exercise”), involvement (e.g. “My family or a member of my household exercised with me”), and facilitation (e.g. “My family or a member of my household changed their schedule so we could exercise together”). The friend support scale had similar items related to friends and classmates. All items referred to the previous three months and response options were “never”, “rarely”, “a few times”, “often” or “very often”. These responses were scored 0–4, respectively, and summed to create two scale scores (0–40), one for family and one for friends. Similar to another study using these scales (Leslie et al., 1999), family and friend support scales were dichotomized into high support (21–40) for students who tended to report “often” or “very often” and low support (0–20) for students who tended to report “never”, “rarely”, or “a few

times”. This dichotomization was performed due to non-normality of the responses and for better interpretability of the results. This scale has demonstrated evidence of criterion-related and construct validity (Sallis et al., 1987), and previous studies have demonstrated reliability of the scale (Prochaska, Rodgers, & Sallis, 2002; Sallis et al., 1987). Internal consistency for these continuous scales in this study was  $\alpha=0.90$  for family and 0.91 for friend support, indicating high reliability.

**Physical Activity**—PA was assessed through three items. Students reported the number of days during the previous week they: 1) were physically active for 60 minutes or more per day and 2) did exercises to strengthen or tone muscles. Students also reported the number of sports teams they played on in the past 12 months. These three outcomes were dichotomized to reflect PA recommendations for middle school-aged youth (60 minutes or more of PA every day and toning muscles three days a week; U.S. DHHS, 2008) and to reflect higher PA (playing on at least one sports team).

**Demographics**—Gender, age, and ethnicity (Latino or Non-Latino) were reported by the students. Students also reported the main language they spoke at home and with friends (English, Spanish, English and Spanish, or other).

**Attitudes, Perceptions, and Beliefs**—PA attitudes were assessed through four items regarding respondents’ feelings towards PA (e.g. “I would rather watch TV than play sports or be active”). Responses were summed and dichotomized to reflect negative and positive attitudes towards PA (“Hearts N’ Parks Community Mobilization Guide,” 2001). Perceived access to equipment or space for PA was assessed with two items (e.g. “There are playgrounds, parks, or gyms close to my home or that I can get to easily”). Response options were “strongly disagree”, “somewhat disagree”, “do not disagree or agree”, somewhat agree”, and “strongly agree.” Responses were scored 0–4, respectively, and dichotomized to low (0–4) and high (5–8) access. Perceived neighborhood safety was similarly measured with two items (e.g. “It is safe to walk or jog alone in my neighborhood during the day”). Response options were the same as the perceived access questions, and first item was scored the same way. The second item was reverse coded to reflect positive feelings of safety. These two items were summed together and dichotomized into unsafe (0–4) and safe (5–8) neighborhood conditions. Students were also asked about intentions to change weight: “Which of the following are you trying to do about your weight?” Response options were “lose weight,” “gain weight,” “stay the same weight,” and “I am not trying to do anything about my weight.” This item was dichotomized into students who were attempting to lose weight and those who were not.

**Anthropometrics**—Height and weight data were obtained from FITNESSGRAM (Meredith, Welk, & Cooper Institute, 2010) testing conducted by PE teachers approximately three months after survey data collection. Students’ height and weight were used to calculate body mass index (BMI), and gender and age-specific percentiles were calculated using the 2000 Centers for Disease Control and Prevention (CDC) Growth Charts for ages 2 to <20 years of age (Kuczmarski et al., 2000). Using CDC guidelines, underweight was defined as a

percentile <5, healthy weight as a percentile <85, overweight as a percentile 85 and <95, and obese was defined as >95<sup>th</sup> percentile (Kuczmarski et al., 2000).

### Statistical Analyses

All analyses were completed using Stata version 14.1, and all variables were tabulated using the sample with FITNESSGRAM data. Differences in level of family support and friend support by demographic characteristics were tested using hierarchical logistic regression models to account for clustering within school, as were differences in demographic characteristics between students with and without FITNESSGRAM data. Internal consistency in the continuous social support scales was measured using Cronbach's alpha.

Hierarchical logistic regression models were used to assess the relationships between the outcomes high family support and high friend support and the independent variables gender, ethnicity, language spoken, weight status, intent to lose weight, access to PA equipment and space, neighborhood safety, and PA attitudes. First, we fit an intercept-only model with a random effect for school to determine if a hierarchical model was appropriate. A second model included the covariates. Interactions between intent to lose weight and weight status and between gender and weight status were tested individually using likelihood ratio tests. The final model included all covariates and significant interactions.

Similarly, hierarchical logistic regression models were used to assess the relationship between the three dichotomized PA outcomes and social support, controlling for PA attitudes, gender, ethnicity, language spoken at home, weight status, intent to lose weight, access to equipment and exercise space, and neighborhood safety. An intercept-only model was used to determine if the hierarchical model was appropriate. A second model included only family and friend social support, and a third model added all other covariates. Interactions between all covariates and the two social support variables were tested individually using likelihood ratio tests. The final model included all covariates and significant interactions.

The two social support scales were only scored when all 10 items had been answered, which resulted in a reduced sample size for the complete case analysis. As a sensitivity analysis, we used multiple imputation using chained equations to impute missing individual scale level items and repeated the hierarchical logistic regression analyses, a technique recommended for use in large survey data with multiple scales (Plumpton, Morris, Hughes, & White, 2016). We decided to use 25 imputed datasets based on previous research, power considerations, and missingness of data (Enders, 2010; Graham, Olchowski, and Gilreath, 2007; Plumpton, Moris, Hughes, & White, 2016).

## RESULTS

Of the 4,773 students surveyed, 3,859 (80.9%) had FITNESSGRAM data. Descriptive statistics of this restricted sample are presented in Table 1. Comparing students with FITNESSGRAM data to those without, significant differences were detected in high friend support, high access to equipment and exercise space, gender, and participating in at least one sports team (not shown).



Table 1 also presents participant characteristics and PA outcomes by level and type of social support. Of those who answered all ten items in each scale, 31.7% were categorized as having high family support, and 17.8% were categorized as having high friend support. A greater proportion of males reported high friend support. Differences in family support were observed by language spoken at home. Perceived neighborhood safety was associated with family support but not friend support, and support of either type was associated with access to equipment or space for PA, positive attitudes towards PA, and all three PA outcomes.

Table 2 presents the results of hierarchical logistic regression models predicting high family and friend support for PA. All else equal, girls had higher odds of perceiving high family support than boys, while there were no gender differences in perceived support from friends. Latino students were less likely to report high family support as compared with non-Latinos, but there were no differences in friend support by ethnicity. Speaking Spanish or both English and Spanish in the home was associated with higher odds of high family support compared to only English speakers. Similarly, speaking only Spanish or both English and Spanish with friends was associated with higher odds of high friend support as compared to those who spoke only English with friends.

Healthy weight students who reported trying to lose weight had lower odds of perceiving high family support for PA. Among students who were not trying to lose weight, family support and friend support for underweight, overweight and obese students were not different from that of healthy weight students. The interaction between weight status and intention to lose weight shows that overweight and obese students who reported trying to lose weight had higher odds of perceiving high family support than students of the same weight status who were not trying to lose weight. In addition, students who reported high access to PA equipment or space and those with positive attitudes towards PA were more likely to perceive high friend and family support. All else equal, neighborhood safety was associated with higher odds of family support but not with friend support. The school-level random effect variances were small, indicating that there was little variance in family or friend support for PA that was accounted for by differences at the school level. Analyses conducted using multiple imputation yielded the same findings (Appendix A).

Table 3 presents the results of regression models predicting the three PA outcomes. Significant school-level error variance indicated that there was significant variance in the PA outcomes attributable to variance at the school level. High family support was associated with higher odds of all three outcomes. High friend support was associated with higher odds of performing muscle strengthening exercises and participating on at least one sports team. Additionally, high friend support was significantly associated with higher odds of an hour of daily PA for students with low access. Girls were less likely to engage in all three PA outcomes than boys, and no differences were observed by ethnicity. Obese students and students who were trying to lose weight had lower odds of participating in an hour of daily PA compared to healthy weight students and those who were not trying to lose weight, respectively.

Access to equipment and space for PA was associated with higher odds of meeting the daily PA recommendation for students with low friend support, but the interaction between friend



support and access yielded a negative coefficient. Obese students were also less likely to meet the recommendation for muscle-strengthening exercises compared to students with a healthy weight status, while students with more access to equipment and space were more likely to meet it. Speaking Spanish at home was significantly associated with higher odds of participating in sports teams compared to English speakers, as was having access to equipment and space. Underweight students had lower odds of sports team participation compared to healthy weight students, as did students who felt safe being active in their neighborhood. Positive attitudes towards PA were associated with higher odds of all three types of PA. With the exception of language spoken at home, there were no differences in the magnitude or significance of the regression coefficients when compared to the imputed models for all three PA outcomes (Appendix A).

## DISCUSSION

The decline in PA during adolescence is a contributor to high rates of overweight and obesity among youth. Social support plays an important role in influencing adolescent PA, but studies examining this relationship have yielded mixed results (De Bourdeaudhuij et al., 2005; Garcia et al., 1995; Higgins et al., 2003; Prochaska et al., 2002; Trost et al., 2003; Ward et al., 2006; Welk et al., 2003; Wu et al., 2003; Zabinski et al., 2003). This study furthers our understanding of the relationship between social support and PA among diverse, urban middle school-aged youth by examining the correlates of support from family and friends as well as its association with PA outcomes.

The findings of this study underscore the need for efforts to promote regular PA as an attainable and positive lifestyle choice for youth, as only a quarter of the sample reported meeting daily PA recommendations and almost half of the sample was either overweight or obese. Prior research has also identified similarly low levels of PA among this age group (CDC & NCHS, 2013; UCLA Center for Health Policy Research, 2013). Over half of students reported they were trying to lose weight, yet a third expressed negative attitudes towards PA. Furthermore, large proportions of students reported low neighborhood safety and low access to equipment or space for PA, both of which were associated with low perceived support for PA. To encourage PA across all youth, these findings highlight the need for interventions targeting psychosocial factors like social support and environmental determinants of PA, such as access and safety.

Overall, social support for PA from family and friends were both consistently strong predictors of all three PA outcomes. High friend and family support were positively associated with meeting daily and weekly recommendations for PA, and with the likelihood of participating on a sports team. This finding confirms what has been observed in previous studies conducted in higher income and less diverse settings (Duncan et al., 2005; Prochaska et al., 2002) and demonstrates that social support is an equally important component of PA promotion among urban, low-income, multi-ethnic middle school students. All else equal, students reporting access to equipment or PA spaces were more likely to be active, a finding which aligns with previous research (Garcia et al., 1995). However, social support for PA from friends appeared to be more predictive of meeting daily PA recommendations for students with low access as compared to those with high access. Thus, friend support seems

to be especially salient for vulnerable groups of youth with limited resources for PA. To the authors' knowledge, the interaction between access and support for PA and its association with PA behavior has not been examined in this way, and this finding may provide new understanding of the influence of social support for PA. Efforts to increase social support can be more immediate, low-cost, and sustainable than those addressing access to PA equipment or space. Given the low proportion of students reporting high support for PA from friends (17.8%), there is an opportunity to increase PA levels through interventions promoting group activity and supportive behaviors among peers in this age group.

Similar to previous research, girls were significantly less likely to be active than boys across all three PA outcomes (Prochaska et al., 2002), despite being more likely to experience high family support for PA (Higgins, Gaul, Gibbons, & Van Gyn, 2003; Wu, Pender, & Noureddine, 2003). It is possible that for some adolescent girls, family support systems are not sufficient to counter self-perceptions of inability or low self-efficacy that result from internalization of gender norms (Chalabaev, Sarrazin, Fontayne, Boiché, & Clément-Guillotin, 2013). Indeed, social support might inhibit PA when prevalent social norms proscribe PA among females. There was no significant difference in PA between students who were Latino and those who were not, when controlling for other factors. Whereas students identifying as Latino perceived less social support for PA from family compared to those who did not identify as Latino, speaking Spanish (either alone or in combination with English) at home was associated with significantly higher odds of perceiving high family support as compared to students who spoke only English. Similarly, speaking Spanish or both English and Spanish with friends was associated with higher perceived friend support. A study of social support among Latino adults found stronger familial support among foreign-born Latinos than their US-born counterparts, suggesting that "retention of culture" may influence perceptions of and actual social support (Almeida, Molnar, Kawachi, & Subramanian, 2009). Our findings suggest that a similar pattern may exist among adolescents and should be studied further.

Interestingly, students who were trying to lose weight had lower odds of being active for at least an hour each day than those who were not trying to lose weight. Obese students also had lower odds of meeting daily PA recommendations. However, overweight and obese students trying to lose weight had higher odds of perceiving high family support for PA compared to overweight and obese students not trying to lose weight. While overweight status has previously been associated with lower perceived support for PA among adolescents (De Bourdeaudhuij et al., 2005), in our sample, overweight and obese students who expressed interest in losing weight report feeling supported in efforts to be physically active. This finding is promising since parental involvement is key to weight control among children and adolescents (Epstein, Myers, Raynor, & Saelens, 1998). However, it is unclear if and how family support translates into increased activity, and further research should consider the mechanisms by which social support influences behavior.

### Limitations and Strengths

Limitations of the study include the use of cross-sectional data in one geographic location, which prevents any causal claims and limits the generalizability of findings. Generalizability

is also limited by the fact that study schools had agreed to take part in a larger intervention study and thus may have some unmeasured differences from other schools. Likewise, grade-level sociodemographic data was not available, so it is unclear if there were any differences between respondents and non-respondents. With the exception of height and weight, data were self-reported by students, and thus susceptible to social desirability and recall bias. In particular, the validity of self-reported PA measures has been questioned, as objective measures of PA tend to find less activity than self-reported measures (Sallis, Prochaska, & Taylor, 2000). The PA measures used here were based on prior research and available resources for a large-scale study. Because height and weight data were collected by teachers, there may be inconsistencies in equipment and measurement methods. Significant differences in covariates were detected between students with and without this data, thus generalizability is further limited. Due to time limitations, the survey instrument did not separately examine social support from individuals (e.g., mother, father, siblings); however, previous research has found that youth respond more accurately with shorter and simpler instruments (Robbins et al., 2008). The Sallis scale has been evaluated for reliability and validity (Sallis et al., 1987) and demonstrated high internal reliability in this study. Finally, this study was conducted in a large sample of students in an urban setting and included a large proportion of Latino students, an understudied group with regards to psychosocial correlates of PA.

### **Implications for Practice**

Our findings indicate that PA promotion remains an important area of work for reducing the prevalence of overweight and obesity in youth. A large proportion of the sample reported wanting to lose weight, however few students met recommendations for daily PA. In addition, social support was consistently predictive of increased activity, suggesting that youth PA interventions should incorporate group activity, possibly collaborating with anti-bullying efforts to promote peer supportive behaviors, and involve family or parent participation. Different perceptions of support by gender and ethnicity suggest that more should be done to make PA normative for all youth, but also suggests that building on existing cultural capital could be a promising way to promote PA among Latino students. Findings regarding access to PA equipment and space and neighborhood safety indicate that efforts to increase PA for youth must also consider environmental factors.

### **CONCLUSION**

Social support for PA from family and friends is a key contributor to increased PA among adolescents. Differences in perceptions of social support by gender, ethnicity, and language emerged and more research is needed to further understand the mechanisms by which these factors influence PA. Additionally, perceived access and safety were significantly associated with both perceptions of support and actual PA outcomes, suggesting that PA interventions should target psychosocial influences on behavior in addition to addressing the physical environment.

### **Supplementary Material**

Refer to Web version on PubMed Central for supplementary material.

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## References

- Aarts H, Paulussen T, Schaalma H. Physical exercise habit: on the conceptualization and formation of habitual health behaviours. *Health Education Research*. 1997; 12(3):363–374. [PubMed: 10174219]
- Almeida J, Molnar BE, Kawachi I, Subramanian SV. Ethnicity and nativity status as determinants of perceived social support: Testing the concept of familism. *Social Science & Medicine*. 2009; 68(10):1852–1858. <https://doi.org/10.1016/j.socscimed.2009.02.029>. [PubMed: 19303184]
- Anderssen N, Wold B. Parental and peer influences on leisure-time physical activity in young adolescents. *Research Quarterly for Exercise and Sport*. 1992; 63(4):341–348. <https://doi.org/10.1080/02701367.1992.10608754>. [PubMed: 1439157]
- Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*. 1977; 84(2):191. [PubMed: 847061]
- Beets MW, Vogel R, Forlaw L, Pitetti KH, Cardinal BJ. Social support and youth physical activity: the role of provider and type. *American Journal of Health Behavior*. 2006; 30(3):278–289. [PubMed: 16712442]
- Belcher BR, Berrigan D, Dodd KW, Emken BA, Chou CP, Spruijt-Metz D. Physical activity in US youth: Effect of race/ethnicity, age, gender, and weight status. *Medicine & Science in Sports & Exercise*. 2010; 42(12):2211–2221. <https://doi.org/10.1249/MSS.0b013e3181e1fba9>. [PubMed: 21084930]
- Byrd-Williams C, Kelly LA, Davis JN, Spruijt-Metz D, Goran MI. Influence of gender, BMI and Hispanic ethnicity on physical activity in children. *International Journal of Pediatric Obesity*. 2007; 2(3):159–166. <https://doi.org/10.1080/17477160701369167>. [PubMed: 17999281]
- Carlson SA, Densmore D, Fulton JE, Yore MM, Kohl HW III. Differences in physical activity prevalence and trends from 3 US surveillance systems: NHIS, NHANES, and BRFSS. *Journal of Physical Activity & Health*. 2009; 6(1):S18–S27. [PubMed: 19998846]
- Centers for Disease Control and Prevention. 2013 Youth Risk Behavior Survey. n.d. Retrieved July 19, 2016, from <http://www.cdc.gov/yrbss>
- Centers for Disease Control and Prevention & National Center for Health Statistics. NHANES National Youth Fitness Survey. Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2013.
- Chalabaev A, Sarrazin P, Fontayne P, Boiché J, Clément-Guillotin C. The influence of sex stereotypes and gender roles on participation and performance in sport and exercise: Review and future directions. *Psychology of Sport and Exercise*. 2013; 14(2):136–144. <https://doi.org/10.1016/j.psychsport.2012.10.005>.
- De Bourdeaudhuij I, Lefevre J, Deforche B, Wijndaele K, Matton L, Philippaerts R. Physical activity and psychosocial correlates in normal weight and overweight 11 to 19 year olds. *Obesity Research*. 2005; 13(6):1097–1105. [PubMed: 15976153]
- Duncan SC, Duncan TE, Strycker LA. Sources and types of social support in youth physical activity. *Health Psychology*. 2005; 24(1):3–10. <https://doi.org/10.1037/0278-6133.24.1.3>. [PubMed: 15631557]
- Enders, CK. *Applied missing data analysis*. New York, NY: Guilford Press; 2010.
- Epstein LH, Myers MD, Raynor HA, Saelens BE. Treatment of pediatric obesity. *Pediatrics*. 1998; 101(Supplement 2):554–570. [PubMed: 12224662]
- Felton GM, Dowda M, Ward DS, Dishman RK, Trost SG, Saunders R, Pate RR. Differences in physical activity between black and white girls living in rural and urban areas. *Journal of School Health*. 2002; 72(6):250–255. [PubMed: 12212410]
- Foran AC, Cermak SA, Spruijt-Metz D. Psychosocial determinants of participation in moderate-to-vigorous physical activity among Hispanic and Latina middle school-aged girls. *Hispanic Health*

- Care International. 2013; 11(3):142–148. <https://doi.org/10.1891/1540-4153.11.3.142>. [PubMed: 24830915]
- Frenn M, Malin S, Villarruel AM, Slaikeu K, McCarthy S, Freeman J, Nee E. Determinants of physical activity and low-fat diet among low income African American and Hispanic middle school students. *Public Health Nursing*. 2005; 22(2):89–97. [PubMed: 15860064]
- Garcia AW, Broda MAN, Frenn M, Coviak C, Pender NJ, Ronis DL. Gender and developmental differences in exercise beliefs among youth and prediction of their exercise behavior. *Journal of School Health*. 1995; 65(6):213–219. [PubMed: 7564283]
- Gordon-Larsen P. Inequality in the built environment underlies key health disparities in physical activity and obesity. *PEDIATRICS*. 2006; 117(2):417–424. <https://doi.org/10.1542/peds.2005-0058>. [PubMed: 16452361]
- Graham JW, Olchowski AE, Gilreath TD. How many imputations are really needed? Some practical clarifications of multiple imputation theory. *Prevention Science*. 2007; 8(3):206–213. [PubMed: 17549635]
- Grieser M, Neumark-Sztainer D, Saksvig BI, Lee JS, Felton GM, Kubik MY. Black, Hispanic, and white girls' perceptions of environmental and social support and enjoyment of physical activity. *Journal of School Health*. 2008; 78(6):314–320. [PubMed: 18489464]
- Hearts N' Parks Community Mobilization Guide. National Institutes of Health; 2001. Retrieved from [http://file.lacounty.gov/dpr/cms1\\_033069.pdf](http://file.lacounty.gov/dpr/cms1_033069.pdf)
- Higgins JW, Gaul C, Gibbons S, Van Gyn G. Factors influencing physical activity levels among Canadian youth. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*. 2003:45–51.
- Kuczumski RJ, Ogden CL, Grummer-Strawn LM, Flegal KM, Guo SS, Wei R, ... Johnson CL. CDC growth charts: United States. *Advance Data*. 2000; (314):1–27.
- Leslie E, Owen N, Salmon J, Bauman A, Sallis JF, Lo SK. Insufficiently active Australian college students: perceived personal, social, and environmental influences. *Preventive Medicine*. 1999; 28(1):20–27. [PubMed: 9973584]
- Meredith, MD., Welk, G., editors. Cooper Institute. *FitnessGram/ActivityGram: Test administration manual*. Champaign, IL: Human Kinetics; 2010. Updated Fourth Edition
- Ogden, CL., Carroll, MD., Fryar Cheryl, D., Flegal Katherine, M. *Prevalence of childhood and adult obesity in the United States, 2011–2014*. Hyattsville, MD: National Center for Health Statistics; 2015. NCHS Data Brief No. 219
- Plumpton CO, Morris T, Hughes DA, White IR. Multiple imputation of multiple multi-item scales when a full imputation model is infeasible. *BMC Research Notes*. 2016; 9(1) <https://doi.org/10.1186/s13104-016-1853-5>.
- Prochaska JJ, Rodgers MW, Sallis JF. Association of parent and peer support with adolescent physical activity. *Research Quarterly for Exercise and Sport*. 2002; 73(2):206–210. <https://doi.org/10.1080/02701367.2002.10609010>. [PubMed: 12092896]
- Richmond TK. Can school income and racial/ethnic composition explain the racial/ethnic disparity in adolescent physical activity participation? *PEDIATRICS*. 2006; 117(6):2158–2166. <https://doi.org/10.1542/peds.2005-1920>. [PubMed: 16740860]
- Robbins LB, Stommel M, Hamel LM. Social support for physical activity of middle school students. *Public Health Nursing*. 2008; 25(5):451–460. <https://doi.org/10.1111/j.1525-1446.2008.00729.x>. [PubMed: 18816362]
- Sallis, JF. 1996–2000 Amherst Health & Activity Study. 2002. Retrieved July 19, 2016, from [http://sallis.ucsd.edu/documents/measures\\_documents/amherst\\_studentsurvey.pdf](http://sallis.ucsd.edu/documents/measures_documents/amherst_studentsurvey.pdf)
- Sallis JF, Simons-Morton BG, Stone EJ, Corbin CB, Epstein LH, Faucette N, ... Taylor WC. Determinants of physical activity and interventions in youth. *Medicine & Science in Sports & Exercise*. 1992; 24(6):S248–S257. [PubMed: 1625550]
- Sallis JF, Grossman RM, Pinski RB, Patterson TL, Nader PR. The development of scales to measure social support for diet and exercise behaviors. *Preventive Medicine*. 1987; 16(6):825–836. [PubMed: 3432232]

- Sallis, JF., Prochaska, JJ., Taylor, WC. A review of correlates of physical activity of children and adolescents; *Medicine & Science in Sports & Exercise*. 2000. p. 963-975. <https://doi.org/10.1097/00005768-200005000-00014>
- Strong WB, Malina RM, Blimkie CJR, Daniels SR, Dishman RK, Gutin B, ... Trudeau F. Evidence based physical activity for school-age youth. *The Journal of Pediatrics*. 2005; 146(6):732–737. <https://doi.org/10.1016/j.jpeds.2005.01.055>. [PubMed: 15973308]
- Trost SG, Sallis JF, Pate RR, Freedson PS, Taylor WC, Dowda M. Evaluating a model of parental influence on youth physical activity. *American Journal of Preventive Medicine*. 2003; 25(4):277–282. [https://doi.org/10.1016/S0749-3797\(03\)00217-4](https://doi.org/10.1016/S0749-3797(03)00217-4). [PubMed: 14580627]
- Trudeau F, Laurencelle L, Shephard RJ. Tracking of physical activity from childhood to adulthood. *Medicine & Science in Sports & Exercise*. 2004; 36(11):1937–1943. <https://doi.org/10.1249/01.MSS.0000145525.29140.3B>. [PubMed: 15514510]
- UCLA Center for Health Policy Research. 2011–2012 California Health Interview Survey. 2013. Retrieved from <http://ask.chis.ucla.edu>
- U.S. Department of Health and Human Services. Physical activity and health: a report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 1996.
- U.S. Department of Health and Human Services. 2008 Physical activity guidelines for Americans. Washington, D.C: U.S. Department of Health and Human Services; 2008.
- Voorhees CC, Murray D, Welk G, Birnbaum A, Ribisl KM, Johnson CC, ... Jobe JB. The role of peer social network factors and physical activity in adolescent girls. *American Journal of Health Behavior*. 2005; 29(2):183. [PubMed: 15698985]
- Ward DS, Dowda M, Trost SG, Felton GM, Dishman RK, Pate RR. Physical activity correlates in adolescent girls who differ by weight status. *Obesity*. 2006; 14(1):97–105. [PubMed: 16493127]
- Welk GJ, Wood K, Morss G. Parental influences on physical activity in children: An exploration of potential mechanisms. *Pediatric Exercise Science*. 2003; 15:19–33.
- Whitt-Glover MC, Taylor WC, Floyd MF, Yore MM, Yancey AK, Matthews CE. Disparities in physical activity and sedentary behaviors among US children and adolescents: Prevalence, correlates, and intervention implications. *Journal of Public Health Policy*. 2009:S309–S334. [PubMed: 19190581]
- Wu T, Pender N, Noureddine S. Gender differences in the psychosocial and cognitive correlates of physical activity among Taiwanese adolescents: A structural equation modeling approach. *International Journal of Behavioral Medicine*. 2003; 10(2):93–105. [PubMed: 12763704]
- Zabinski MF, Saelens BE, Stein RI, Hayden-Wade HA, Wilfley DE. Overweight children's barriers to and support for physical activity. *Obesity Research*. 2003; 11(2):238–246. [PubMed: 12582220]

**Table 1**  
 Characteristics of the Sample in Total and by Family and Friend Social Support for Physical Activity<sup>1,2</sup>

Characteristics	Total		Family		Friend	
	Percent	N	Low	High	Low	High
		<b>N = 3,859</b>	<b>N = 2,337</b>	<b>N = 1,089</b>	<b>N = 2,857</b>	<b>N = 590</b>
		<b>Percent</b>	<b>Percent</b>	<b>Percent</b>	<b>Percent</b>	<b>Percent</b>
Gender						
Male	48.7		48.1	48.0	46.8	53.6 <sup>***</sup>
Female	51.3		51.9	52.0	53.2	46.4
Hispanic/Latino						
Yes	68.5		68.5	68.7	68.2	69.3
No	31.5		31.5	31.3	31.8	30.7
Language at Home						
English	27.9		30.1	25.2 <sup>**</sup>	29.0	25.6
Spanish	8.2		7.9	8.2	7.7	9.2
English and Spanish	55.6		53.4	58.5	54.7	57.2
Other	8.3		8.6	8.1	8.6	8.1
Language with Friends						
English	67.7		69.8	66.6	69.1	61.3 <sup>**</sup>
Spanish	0.7		0.4	1.0	0.6	1.3
English and Spanish	29.5		28.0	30.4	28.4	35.2
Other	2.1		1.9	2.0	1.9	2.2
Trying to lose weight						
Yes	54.0		57.9	60.1	58.8	56.7
No	46.0		42.1	39.9	41.2	43.3
Weight Status						
Underweight	3.0		3.1	2.6 <sup>*</sup>	2.8	3.6
Healthy	52.8		54.5	50.2	52.8	54.6
Overweight	19.7		19.5	19.5	20.0	18.0
Obese	24.5		22.9	27.7	24.4	23.9



Characteristics	Total		Family		Friend	
	N = 3,859		N = 2,337		N = 1,089	
	Percent	High	Percent	High	Percent	High
Access to equipment and exercise space						
High	66.0	82.3***	59.6	82.3***	64.3	78.0***
Low	34.0	17.7	40.4	17.7	35.7	22.0
Neighborhood safety						
Safe	52.9	59.6***	50.0	59.6***	53.0	55.2
Unsafe	47.1	40.4	50.0	40.4	47.0	44.8
Physical Activity Attitudes						
Positive	73.7	82.5***	69.4	82.5***	72.0	83.8***
Negative	26.3	17.5	30.6	17.5	28.0	16.2
Exercises 60+ min/day every day of the week						
Yes	25.7	36.0***	20.9	36.0***	22.3	40.3***
No	74.3	64.0	79.1	64.0	77.7	59.7
Performs muscle-strengthening exercise 3 times/week						
Yes	61.8	73.5***	55.4	73.5***	58.4	77.5***
No	38.2	26.5	44.6	26.5	41.6	22.5
Participates in at least one sports team						
Yes	60.1	72.0***	53.8	72.0***	55.8	75.3***
No	39.9	28.0	46.2	28.0	44.2	24.7

\* p < 0.05,

\*\* p < 0.01,

\*\*\* p < 0.001

<sup>1</sup> 433 and 412 individuals did not report complete family and friend support scales, respectively. 255 of these did not report either scales. Due to missing data, some summary statistics presented were calculated with smaller sample sizes than reported in the table. Percents may not sum to 100 due to rounding.

<sup>2</sup> Significant differences in family support status and friend support status by characteristics were tested using Wald chi-square tests in hierarchical logistic regression models.

**Table 2**

Summary of Hierarchical Logistic Regressions Predicting High Social Support

Coefficients	Family	Friends
	N = 3,041	N = 3,098
	OR (95% C.I.)	OR (95% C.I.)
<b>Fixed Effects</b>		
Female	1.19 (1.01, 1.40) *	0.82 (0.68, 1.00)
Hispanic/Latino	0.78 (0.62, 0.99) *	1.00 (0.80, 1.25)
Language Spoken <sup>1</sup>		
English (reference)		
Spanish	1.70 (1.20, 2.39) **	3.35 (1.30, 8.65) *
English and Spanish	1.56 (1.24, 1.96) ***	1.53 (1.23, 1.90) ***
Other	1.14 (0.82, 1.57)	1.41 (0.71, 2.81)
Trying to Lose Weight	0.78 (0.62, 0.98) *	1.03 (0.82, 1.29)
Weight Status		
Underweight	0.76 (0.45, 1.29)	1.15 (0.67, 1.97)
Healthy (reference)		
Overweight	0.63 (0.38, 1.03)	0.79 (0.59, 1.04)
Obese	0.74 (0.38, 1.41)	0.94 (0.72, 1.22)
Access to Equipment and Exercise Space	2.95 (2.43, 3.58) ***	1.95 (1.55, 2.46) ***
Neighborhood Safety	1.26 (1.07, 1.49) **	0.95 (0.78, 1.15)
Positive PA Attitudes	1.96 (1.61, 2.40) ***	2.00 (1.54, 2.59) ***
Trying to Lose Weight x Weight Status		
Underweight	2.62 (0.57, 12.15)	----
Healthy (reference)		
Overweight	2.15 (1.23, 3.77) **	----
Obese	2.47 (1.24, 4.96) *	----
<b>Random Effects</b>		
School Level Error Variance <sup>2</sup>	0.00	0.00

\*  
p < 0.05,\*\*  
p < 0.01,\*\*\*  
p < 0.001

<sup>1</sup> Language Spoken variable refers to “Language Spoken at Home” for the Family Support output and “Language Spoken with Friends” for the Friend Support output.

<sup>2</sup> Significance of school level error variance were tested using likelihood ratio tests.

Table 3

## Summary of Hierarchical Logistic Regressions Predicting 3 Outcomes

Coefficients	Exercising 60+ Minutes Per Day Every Day of the Week	Performing Muscle Strengthening Exercises Every Day of the Week	Participation on at Least 1 Sports Team
	N = 2,828 OR (95% C.I.)	N = 2,840 OR (95% C.I.)	N = 2,840 OR (95% C.I.)
<b>Fixed Effects</b>			
High Family Support	1.64 (1.35, 2.00)***	1.82 (1.51, 2.21)***	1.83 (1.51, 2.21)***
High Friend Support	3.31 (2.07, 5.30)***	2.03 (1.58, 2.61)***	1.73 (1.36, 2.21)***
Female	0.60 (0.50, 0.72)***	0.81 (0.69, 0.96)*	0.77 (0.66, 0.91)**
Hispanic/Latino	0.91 (0.71, 1.18)	0.84 (0.66, 1.07)	1.02 (0.81, 1.29)
Language Spoken at Home			
English (reference)			
Spanish	1.13 (0.77, 1.66)	1.19 (0.84, 1.70)	1.44 (1.00, 2.07)*
English and Spanish	0.86 (0.66, 1.11)	1.24 (0.98, 1.56)	0.85 (0.68, 1.07)
Other	1.08 (0.77, 1.52)	0.90 (0.66, 1.24)	0.65 (0.47, 0.89)**
Trying to Lose Weight	0.70 (0.56, 0.86)**	1.06 (0.88, 1.29)	1.04 (0.86, 1.25)
Weight Status			
Underweight	0.62 (0.37, 1.05)	0.65 (0.41, 1.04)	0.57 (0.36, 0.90)*
Healthy (reference)			
Overweight	0.81 (0.62, 1.04)	0.85 (0.68, 1.06)	0.97 (0.77, 1.21)
Obese	0.71 (0.55, 0.92)*	0.76 (0.61, 0.95)*	0.84 (0.67, 1.05)
Access to equipment and exercise space	1.75 (1.38, 2.21)***	1.37 (1.14, 1.63)**	1.49 (1.25, 1.78)***
Neighborhood Safety	1.07 (0.89, 1.28)	1.01 (0.85, 1.19)	0.83 (0.71, 0.98)*
Positive PA Attitudes	1.42 (1.13, 1.78)**	1.52 (1.27, 1.83)***	2.02 (1.69, 2.42)***
High Fr. Supp. x Access	0.45 (0.27, 0.77)**	----	----
<b>Random Effects</b>			
School Level Error Std. Dev./	0.19*	0.50***	0.28***

\* p &lt; 0.05.

Significance of school level error variance were tested using likelihood ratio tests.

100.0 > d  
\*\*\*

10.0 > d  
\*\*

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