

Delving Into the Social Ecology of Leisure-Time Physical Activity Among Adolescents From South Eastern Spain

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Background: Worldwide, there is a growing concern with adolescents' low levels of physical activity (PA). We used a comprehensive social ecological framework to uncover factors associated with leisure-time physical activity (LTPA) among adolescents from southeastern Spain. **Methods:** A population-based sample of 3249 adolescents aged 12–17 participated in a school-based survey in 2006. Potential correlates of participation in and level of LTPA were assessed through self-report. LTPA levels were also self-reported. We used gender-stratified logistic regression models to examine the associations among the variables of interest. **Results:** Consistent with a social ecological perspective, analyses revealed several factors, corresponding to different levels of organization (demographic, biological, psychological, behavioral, social) and behavioral settings (family, peer group, school), significantly associated with LTPA. Some of these factors varied as a function of gender and depending on whether the outcome considered was nonparticipation vs. participation in LTPA or high vs. low level of involvement among participants. Overall, the findings highlight the role of health-related participation motives, significant others' attitudes toward PA, and grade in physical education as correlates of LTPA in this sample. **Conclusions:** Continued research is necessary to understand the complex interplay of factors and settings associated with adolescent LTPA and the role of gender.

Keywords: multiple levels, behavioral settings, gender

As low physical activity (PA) levels of adolescents become a cause for concern in many countries around the world,¹ researchers and public health authorities are engaged in an ongoing effort to understand the causes of the problem and to find solutions to reverse this trend. In Spain, for example, a study of a nationally representative sample of youth concluded that < 30% of participants were physically active at recommend levels.² Furthermore, the percentage of physically active boys was higher than that of physically active girls in all age categories.

One overarching conclusion of research addressing adolescent PA behavior is the complexity of influences involved.^{3,4} In an attempt to make sense of and harness this complexity for the design of effective interventions, ecological models have become increasingly popular.^{5,6} Broadly speaking, according to ecological models, behavior is a function of the dynamic interaction between the person and multiple levels of his or her environment. Reviews of literature on correlates of adolescent PA^{7,8} have adopted an ecological framework to organize the findings according to demographic and biological variables (eg, age, BMI, socioeconomic status); psychological variables (eg, self-perceptions, motivation);

behavioral variables (eg, smoking, television watching time), social and cultural variables (eg, modeling, social support); and physical environmental variables (eg, availability of facilities).

A subset of a broader ecological framework, social ecological models emphasize the role that social and cultural dimensions of the environment play in shaping individuals' perceptions of themselves and the world around them.⁹ For example, young people may develop different attitudes toward PA given their social and cultural environments and how they make sense of them. Social ecological approaches also call our attention to the role of social and cultural factors as either affordances or constraints to particular behaviors. As a growing body of research grounded on a Social Determinants of Health perspective^{10,11} demonstrates, engaging in health-enhancing behaviors such as participation in leisure-time physical activity (LTPA) is far from being only a matter of an individual's decision or intention. Not having a supportive peer group, having unemployed parents, or living in a neighborhood with limited PA facilities and programs may be important barriers to youth participation in recreational or LTPA.

Using a social ecological framework to investigate correlates of adolescent LTPA is important because it allows us to better comprehend the complex interplay of individual and social environmental variables, and to situate them within a coherent conceptual framework. It also allows us to determine which variables are more

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influential when examined together and, therefore, to identify the best candidates for interventions that may lead to policy development.

Given that growing evidence indicates that avoiding prolonged periods of inactivity may be as important as meeting current recommendations regarding moderate-to-vigorous physical activity (MVPA),¹² public health guidelines increasingly emphasize the avoidance of physical inactivity as a crucial factor for health over the life span.^{1,13} In light of this, and considering the implications for intervention, we sought to better understand the factors associated with non-participation versus participation in LTPA. Then, for those who participated in LTPA, we investigated factors associated with higher levels of activity.

The purpose of this study was to investigate factors associated with LTPA in a sample of adolescents from southeastern Spain. Variables were chosen to reflect a social ecological view. Biological and demographic (eg, BMI, age), psychological (eg, physical self-perceptions), behavioral (eg, smoking), social (eg, parental, peer attitudes), and school (eg, physical education experience and grade) variables were chosen based on reviews of the literature.^{7,8}

Methods

Participants

We analyzed data from a school-based survey on PA-, sport-, and health-related habits conducted during regular school hours in secondary schools in the southeastern Spanish provinces of Almería, Granada, and Murcia. The survey was approved by the bioethics committee of the University of Murcia and administered between February and May 2006 according to the requirements of the bioethics committee and those of participating schools. A 4-stage stratified sampling strategy that accounted for type of school, town/city population size, gender, and the grade students were in was used to make sure the sample was representative of the target population [ie, all students in public and private schools of the “Enseñanza Secundaria Obligatoria” (Mandatory Secondary Education) system in the provinces of Almería, Granada, and Murcia during the 2005–2006 school year]. Participants were 3249 Spanish students aged 12–17 years at the time of data collection. Of these, 1548 were female and 798 attended private schools. Surveys were administered during regular classes by trained research assistants. Research assistants were available to answer participants’ questions. No other adults were present in the classroom during survey administration.

Measures

Leisure-Time Physical Activity.

A screening question was used to determine whether respondents reported engaging in LTPA or not. The

question was based on the following definition of LTPA: “Leisure-time physical activities refer to those performed intentionally and with some regularity to get physical exercise, including organized activities such as football, basketball, track and field, tennis, competitive swimming . . . less structured activities such as mountaineering, touring by bicycle, climbing, scuba diving . . . or those one engages in according to his/her particular preferences or needs, such as walking, running, swimming, or bicycling. Following this standard definition of LTPA, participants were asked to state whether a) they engaged in LTPA during the 2005–2006 academic year, b) they did not engage in LTPA during the 2005–2006 academic year, or c) they never engaged in LTPA. Respondents who chose the last 2 options were categorized as “non-participants.” Those who reported engaging in LTPA answered 5 additional questions (see Table 1) and a sum index of PA (PAI) was computed. These questions, adapted from previous work¹⁴ concerned 1) respondents’ frequency of participation in organized sports after school, 2) respondents’ frequency of participation in nonorganized sport after school, 3) number of times a week engaging in at least 20 minutes of PA after school, 4) the number of hours per week respondents engage in PA in a way that makes them get out of breath and sweat, and 5) whether respondents take part in sport competitions and level at which it occurs. Before summation, question scores were recoded so the weight of each was similar. The resulting PAI value ranged from 5–15. Consistent with previous research with adolescents that use this measure,^{15,16} to better represent PA patterns, the PAI score was used to classify participants as vigorously active, moderately active, lightly active, or insufficiently active. For analytical purposes, a dichotomous variable was created by grouping together participants classified as vigorously active and moderately active, on the one hand, and lightly active and insufficiently active, on the other hand.

\ insert table 1 \

Weight status was determined based on BMI, which we derived from the adolescents’ self-reported weight and height using the formula $BMI = (\text{weight in kg})/(\text{height in m})^2$. Participants were identified as “normal-weight,” “underweight,” “overweight,” or “obese” according to the age- and sex-specific BMI cut-offs defined by the World Health Organization.¹⁷

Perceived Health.

Participants indicated whether their general health was “very good,” “good,” “bad,” or “very bad.” For the analysis, a dichotomous response option comprising “very good” and “good,” on the one hand, and “bad” and “very bad,” on the other, was created.

Physical self-perceptions were assessed with 4 items, rated on a 4-point Likert scale, concerning participants’ perceptions of sport competence, physical

strength, physical appearance and being physically active vs. inactive. In a principal component analysis, all 4 items loaded on a single factor and showed acceptable internal consistency (Cronbach's $\alpha = 0.73$). For each item, participants were asked to compare themselves with peers of the same age and sex. Higher scores corresponded with more positive self-perceptions. We created categorical scoring levels (low, medium, high) based on similar work.¹⁸

Participation motives were assessed with 19 items addressing common reasons for participation in PA and sport. These items were subject to a principal component analysis revealing 1 interpretable factor with acceptable internal consistency (Cronbach's $\alpha = .73$). This factor consisted of 6 items representative of physical and mental health motives (eg, "physical activity and sport allow me to improve my mood.") Based on previous research,¹⁸ we created categorical scoring levels (low, medium, high). Only participants who reported engaging in LTPA during the 2005–2006 academic year responded to this subscale.

Tobacco and Alcohol Use.

Participants who responded "usually," "occasionally," or "only during weekends" to the question "How often do you take any of the following substances: a) alcoholic beverages, b) cigarette, tobacco, cigar?" were considered as users. Participants who answered "I quit" or "never" were categorized as nonusers.

Parental and friend attitudes toward the participants' LTPA were assessed with the questions "Generally speaking throughout your life, how were your parents' attitudes toward the physical and sport activities you practiced in your leisure-time? And your friends'?" In each case, the response options were: "they encouraged me"; "they pushed me to take part in them"; "they did not care"; "they set barriers or obstacles."

Parental LTPA.

Participants indicated whether their father and mother a) currently took part in LTPA and sport; b) took part in LTPA and sport in the past, but not now; or c) never took part in LTPA and sport.

Perceptions of the physical education class were assessed with 19 statements scored on a 4-point Likert scale ranging from "I do not agree at all" to "I very much agree." A principal component analysis revealed 1 interpretable factor with appropriate internal consistency (Cronbach's $\alpha = 0.84$). This factor, consisting of 11 items, reflected a perception of the physical education class as a useful, enjoyable, and positive experience that allows students to learn things they can use outside of class to lead more active and healthier lives. Categorical scoring levels (low, medium, high) were created based on previous and similar work.¹⁸

Grade in physical education was a self-reported measure with options ranging from 1–10, which were converted into the following categories, based on the

grading system used in Spanish schools: "fail," "pass," "very good," and "excellent."

To ensure content validity, all questions were reviewed by a group of experts in the areas of survey methodology, youth health, and PA, and then pilot-tested with small samples of adolescents not included in the final sample. Based on the feedback of experts and adolescents, modifications were made to ensure clarity and relevance.

Statistical Analyses

Frequencies were produced to determine the proportion of respondents in each of the categories corresponding to the different study variables. Multivariate logistic regression models were used to examine the associations among the variables of interest and to calculate odd ratios (OR) and 95% confidence intervals (CI). Odds ratios were considered statistically significant if 95% CIs did not cross 1.0. To examine correlates of LTPA participation, adolescents who reported participation in LTPA during the academic year 2005–2006 were compared with those who reported they had not participated during that year or that they had never participated. Given the implications for intervention, we sought to identify those factors associated with higher risk of reporting nonparticipation. Subsequently, participants categorized as insufficiently or lightly active were compared with individuals who engaged in MVPA to identify factors associated with compliance with recommended activity levels. Guided by an ecological framework^{5,8} and previous research,¹⁶ in each model predictor variables were entered in separate blocks in the following order: biological and demographic variables, psychological variables, behavioral variables, family- and peer- related variables, and school-based variables. We also tested interactions between weight status and self-perception variables (perceived health, physical self-perceptions). All interactions were nonsignificant and therefore were not included in the final models. All models were run separately by gender. Missing data were excluded using a listwise procedure. This resulted in data for 1379 boys and 1275 girls available for the regression models examining correlates of LTPA and 1052 boys and 654 girls for the models examining correlates of MVPA only with participants who reported some degree of LTPA. The actual percentages of missing data in the 4 regression models were 18.9%, 17.6%, 7.5%, and 8.4%, respectively.

Results

Descriptive statistics revealed that 51.3% of girls and 76% of boys engaged in LTPA. Of those who engaged in LTPA, 54.3% of girls, and 79.2% boys were active at the MVPA level. With respect to the whole sample, twice as many boys as girls reported being either overweight or obese (21.1% vs. 9.3%), and more boys than girls reported high physical self-perceptions (56.7% vs. 33.2%). Gender differences were also evident with respect to grade in

physical education. Fewer girls who did not engage in LTPA excelled in physical education compared with boys who did not (17.3% vs. 27.8%). For all other variables considered in this study, percentages of adolescents in each category were comparable for boys and girls (Table 2).

\ insert table 2 \

Tables 2 and 3 present the results of the logistic regression analyses conducted separately by gender. Common to boys and girls, the odds of being categorized as “nonparticipant” in LTPA were higher for adolescents reporting less positive physical self-perceptions, and those who smoke. Odds of reporting nonparticipation were also higher for adolescents of both genders whose friends did not care about their participation, and whose father had never been active. Less-positive perceptions of physical education were associated with higher odds of reporting non participation in LTPA in both genders, but the effect was more consistent across perception categories in boys. Similarly, lower grades in physical education corresponded to higher odds of nonparticipating in LTPA, although in this case the effect was more consistent across grade levels in girls. Finally, boys who attended public schools also had higher odds of not participating in LTPA.

\ insert table 3 \

For those who reported participation in LTPA, the odds of engaging in MVPA were lower for adolescents of both genders who reported lower levels of participation motives associated with improved health and for those with lower grades in physical education. Being older was associated with lower odds of MVPA in girls only. Being obese, however, was associated with higher odds of MVPA in girls and with lower odds in boys. Girls whose friends did not care about their participation had lower odds of MVPA and the same was true for boys whose parents did not care about their participation. Lower odds of reporting MVPA were also observed in boys in the middle physical self-perceptions category. Finally, in boys only as well, attending public schools was associated with higher odds of reporting MVPA when only those who participated in LTPA were considered in the analyses.

Discussion

This study investigated correlates of participation in and levels of LTPA in a population-based sample of adolescents from southeastern Spain, a group for which little information is available in the literature. Consistent with a social ecological perspective, the results revealed a host of factors corresponding to different levels of organization (demographic, biological, psychological, behavioral, social) and behavior settings (family, peer group, school), associated with LTPA in this sample. In

addition, in line with findings from Strauss et al.¹⁹ and Ruiz Juan et al.,¹⁶ some correlates differed according to whether the outcome variable considered was participation in LTPA or, for those who participated, the level at which they were active. Notably, smoking, and attitudes toward physical education were associated with LTPA participation, but not with level of participation, whereas, age and weight status were only associated with level of participation. Similarly, although still influential in boys regarding their MVPA, physical self-perceptions were consistently more influential across genders and self-perception categories in terms of participation in LTPA. Furthermore, paternal modeling of PA was influential in terms of participation versus nonparticipation, but not in terms of level of participation. Conversely, parental attitudes toward adolescents’ PA were associated with intensity levels but not with actual participation. This suggests that, to be successful, interventions designed to increase adolescent PA may need to target a variety of factors using various strategies according to whether the primary goal is to promote MVPA or simply to get adolescents to move more.

In a similar vein, notable gender differences emerged in the analyses, which may also have implications for the design of activity promotion strategies. Particularly interesting were differences in the association of obese status and significant others’ attitudes and modeling behaviors with MVPA. Gender differences in the association between type of school (public vs. private) and LTPA and MVPA were also noted. These differences, and others, are further addressed below.

Previous research suggests that the relationship of age, gender, and weight status with adolescent PA is complex and the evidence inconclusive. For example, while several studies have noted a decline in PA levels throughout adolescence,^{2,19–21} others have failed to document such a trend.²² Furthermore, in some studies, the decline occurred only in girls²³ or was particularly apparent in girls.¹⁹ Findings from this study qualify previous work illustrating that the decline in PA levels throughout adolescence observed in some studies, particularly in girls, may reflect for the most part, declines in more intense forms of PA in older girls. In this regard, our findings stand in line with work investigating the PA patterns of Spanish adolescents.²⁴ The complexity of the relationship between demographic and biological variables and adolescent PA is further illustrated in research showing that the relationship between adolescent PA and weight status differs by form of participation (eg, sports participation, strength training, and physical education enrollment) and by gender.²⁵ This relationship may depend also on whether it is assessed on a cross-sectional or longitudinal basis.^{20,26} Our study adds another layer to this complexity by showing that this relationship is also a function of the level of involvement in LTPA being considered, results that are in line with those of Ruiz Juan et al.¹⁶ Extending these results, our findings

indicate that the strength and direction of this relationship varies as a function of gender as well. In our study, being obese was associated with higher odds of MVPA in girls and with lower odds in boys. In fact, obese girls were almost 3 times more likely to engage in MVPA than normal-weight girls. It is thus possible that obese girls saw participation in MVPA as an opportunity to lose weight and improve their body image more so than obese boys. It is also likely that girls' motivation to be active may be more related to weight loss. This raises concerns since girls who are not obese may not see the reason to be active at recommended levels.

Perceived health, physical self-perceptions and participation motives were the 3 psychological-level variables included. Many have found an association between adolescents' self-perceptions and PA^{16,21,26,27} and also between adolescents' motivation and PA.^{28,29} However, the elusiveness of this relationship is evidenced in a study using a person-centered approach that found smaller-than-expected differences in PA levels in clusters of adolescent girls with different motivation and self-perception profiles.³⁰ Likewise, Viira and Rausepp²⁹ concluded that for adolescent males and females, different psychological measures of motivation and self-perception predicted MVPA behavior. In our study, more favorable physical self-perceptions were associated with participation in LTPA in both genders. However, when comparing those who engaged in LTPA at lower versus higher levels, physical self-perceptions only discriminated between the higher and middle groups in boys and did not discriminate between groups in girls. This suggests that a threshold may exist regarding the positive effects of favorable physical self-perceptions on participation.

In the youth PA literature, participation motives have been mainly conceptualized as goal orientations (eg, task, ego); the effects of other participation motives (eg, health, social) on adolescents' LTPA levels and patterns remain largely unknown.⁸ As our results reveal, adolescents of both genders appear to readily make the link between engaging in MVPA and improved physical and mental health. Future research should continue to investigate the strength of this relationship along with realistic intervention strategies, if warranted.

Consistent with previous research,³¹ we included tobacco use as a behavioral variable. Both the Sallis et al⁷ and van der Horst et al⁸ reviews indicate inconclusive evidence for an association between smoking and PA, suggesting the need for more research. Given the lack of research on the association of alcohol use, another lifestyle related risk factor,³² with adolescent PA, we also included this behavioral variable. In our sample, tobacco use was associated with lower self-reported participation in LTPA, indicating that boys and girls who smoke may be at higher risk of inactivity. This may be reflective of clustering of unhealthy behaviors.³³ On the other hand, alcohol use was not linked with participation in level of LTPA.

A growing amount of research indicates that PA participation during adolescence can be considered, at least in part, as a socialization process. For example, there is evidence of a positive association between encouragement and support from significant others and adolescent PA levels.^{19,21,34} Moreover, parents' and peers' attitudes toward PA appear to influence adolescents' PA levels.^{19,20,35} Our findings show that while peer attitudes toward PA may be important for encouraging LTPA participation in boys and girls and fostering MVPA participation in girls, parental attitudes may matter most when it comes to sustaining adolescent boys' involvement in MVPA. Thus, the finding that measures of social influence appear to be positively correlated with more-intense PA¹⁹ could be more applicable to measures of parental influence.

It is noteworthy that, in all cases where parental and friend attitude had a significant effect, parental and friend apathy toward adolescent LTPA was linked with lower levels of LTPA in boys and girls than when parents and friends actively discouraged this behavior. With respect to parental attitudes, boys whose parents did not care about their LTPA practices were less likely to engage in MVPA than boys whose parents discouraged them. Parental apathy toward LTPA could perhaps be interpreted as lack of support by the adolescent boy. Similarly, adolescent boys and girls whose friends did not care about their LTPA practices were less likely to participate than those whose friends discouraged them. Again, friend apathy toward LTPA may be interpreted as lack of support by adolescent boys and girls. Alternatively, a parent or friend might actively discourage a PA behavior for an adolescent who is already highly active and cannot fit another activity into his or her schedule.

Our study revealed that having an active father is associated with participation in LTPA in boys and girls. While this sheds some light on the largely inconclusive evidence concerning the association between parental modeling behavior and adolescent PA,^{7,8,20} it also raises questions regarding the less important role of maternal modeling for girls' LTPA given reports elsewhere that younger adolescents' levels of PA appear to be especially influenced by their same sex parent³⁶ From a social ecological perspective, schools constitute a choice environment to target health-related lifestyle habits.⁵ As research shows,³⁶⁻³⁸ 1 particular component of this environment, physical education programs, appears as a particularly promising behavioral setting for the promotion of regular PA. In line with previous research,^{16,39,40} our findings reveal that designing enjoyable class experiences that focus on students learning skills they can use outside of class may be an effective way of encouraging LTPA through physical education in boys and girls, but particularly in the former. In addition, consistent with and extending past research,^{41,42} a good grade in physical education was one of the best predictors, all other variables considered, of

participation in LTPA and, particularly, of MVPA. Given that, together with participation in organized sport, grade in physical education has been found to be the best predictor of PA in young adulthood,^{41,42} continued research is needed to tease out dimensions of the physical education setting and experience that may be more influential for PA participation during adolescence and into adulthood. Research using longitudinal designs will be particularly useful to investigate the temporal order of the relationship between grade in physical education and LTPA, as it is likely that highly active students get better grades in physical education.

Another school-level variable that has recently received attention in the adolescent PA literature is type of school (public vs. private).^{16,24} In our study, boys attending public schools reported less participation in LTPA than boys in private schools. However, when considering only those who participated in LTPA, boys in public schools also reported more MVPA than boys in private schools. These results partially echo those from a study by Peiró-Velert et al,²⁴ who found that adolescents attending public schools have higher PA energy expenditure than those from private schools, particularly during weekends. However, the percentage of adolescents considered inactive was also slightly higher. This led the authors to suggest that there is variability in levels of PA of secondary public school students during weekends, with a very active group but also an inactive group. It is thus possible that the variability in PA patterns of public school boys also observed in our study may have been due, at least in part, to a similar effect of day of the week on activity. More generally, it is also possible that the heterogeneous student body typically found in public schools may result in greater variability in PA patterns. However, neither hypothesis explains satisfactorily the gender difference observed in our study.

This study has several limitations. Notably, its cross-sectional design precludes making any causal inferences. In addition, the use of self-reported data, chiefly the assessment of weight status and PA levels and patterns of participants and their parents, may have resulted in some inaccuracies and response biases. Given the important role parental PA modeling behavior demonstrated in this study, another limitation is the lack of a comparable measure of peer PA modeling behavior. Nevertheless, this study is based on a large, representative sample and incorporates multiple variables within a coherent conceptual framework illustrating the complex interplay of individual and social environmental factors and their relative influence on adolescent PA behavior. Separate analyses by gender also expose notable differences between boys and girls regarding correlates of LTPA that may have implications for PA promotion practice. Further, by accounting for possible differences in correlates of PA stemming from different LTPA patterns and levels, this study addresses a notable limitation in the adolescent PA literature.⁸

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Table 1 Physical Activity Questions

| Question | Scale Response Alternatives |
|---|---|
| How many times per week do you take part in competitive sport activities? | 4-point scale ranging from “Never” to “4 or more times/week” |
| How many times per week do you participate in recreational physical activities such as walking, bicycling, swimming, and running? | 4-point scale ranging from “Never” to “4 or more times/week” |
| How often do you take part in any physical activities for at least 20 minutes? | 5-point scale ranging from “Never” to “Everyday” |
| How many hours per week do you take part in physical activities/sports in a way that makes you sweat and breathe hard? | 5-point scale ranging from “None” to “7 hours or more” |
| Do you take part in sport competitions? | 5-point scale ranging from “No, I have never participated” to “National or international level” |

Table 2 Adjusted Odds Ratios (AORs) for Nonparticipation in LTPA by Gender

| | Girls (n = 1275) | | Boys (n = 1379) | |
|----------------------------------|------------------|------------------|-----------------|------------------|
| | % | AOR (CI) | % | AOR (CI) |
| Age | | | | |
| 12–14 | 55.6 | 1.00 | 56.9 | 1.00 |
| 15–17 | 44.4 | 1.03 (.79–1.34) | 43.1 | 1.24 (.93–1.66) |
| BMI | | | | |
| Normal weight | 80.0 | 1.00 | 69.5 | 1.00 |
| Underweight | 10.8 | 1.26 (.85–1.88) | 9.4 | .99 (.61–1.60) |
| Overweight | 4.5 | .64 (.36–1.15) | 9.3 | .75 (.46–1.24) |
| Obese | 4.8 | 1.10 (.60–1.99) | 11.8 | 1.45 (.98–2.15) |
| Perceived health | | | | |
| Good/very good | 95.9 | 1.00 | 97.2 | 1.00 |
| Bad/very bad | 4.1 | .75 (.40–1.39) | 2.8 | 1.38 (.67–2.84) |
| Physical self-perceptions | | | | |
| High | 33.2 | 1.00 | 56.7 | 1.00 |
| Medium | 59.0 | 2.00 (1.52–2.63) | 37.8 | 1.83 (1.37–2.44) |
| Low | 7.8 | 3.39 (2.01–5.74) | 5.5 | 3.37 (1.97–5.75) |
| Alcohol | | | | |
| No | 61.9 | 1.00 | 67.1 | 1.00 |
| Yes | 38.1 | .90 (.67–1.22) | 32.3 | .83 (.59–1.16) |
| Smoking | | | | |
| No | 82.0 | 1.00 | 88.0 | 1.00 |
| Yes | 18.0 | 1.47 (1.02–2.10) | 12.0 | 1.57 (1.01–2.44) |
| Parental attitudes | | | | |
| They have encouraged me | 78.9 | 1.00 | 80.7 | 1.00 |
| They have pushed me to take part | 3.0 | 1.56 (.74–3.31) | 2.8 | 1.47 (.71–3.03) |
| They have not cared | 13.8 | 1.23 (.85–1.79) | 12.9 | 1.36 (.93–1.98) |
| They have set barriers/obstacles | 4.3 | 1.06 (.58–1.95) | 3.4 | 1.65 (.85–3.22) |
| Friends' attitudes | | | | |
| They have encouraged me | 70.4 | 1.00 | 69.5 | 1.00 |
| They have pushed me to take part | 2.8 | 1.81 (.86–3.83) | 4.0 | 1.29 (.66–2.49) |
| They have not cared | 24.7 | 1.73 (1.28–2.33) | 23.6 | 1.93 (1.42–2.62) |
| They have set barriers/obstacles | 2.1 | 1.31 (.55–3.13) | 3.0 | 1.86 (.92–3.80) |
| Father's LTPA | | | | |
| Currently | 29.7 | 1.00 | 33.3 | 1.00 |
| Previously | 48.6 | 1.08 (.80–1.45) | 52.6 | .98 (.71–1.36) |
| Never | 21.7 | 1.83 (1.24–2.69) | 14.1 | 1.68 (1.07–2.63) |
| Mother's LTPA | | | | |
| Currently | 22.5 | 1.00 | 20.1 | 1.00 |
| Previously | 42.2 | 1.14 (.82–1.57) | 42.9 | 1.38 (.92–2.07) |
| Never | 35.3 | 1.37 (.95–1.96) | 37.1 | 1.48 (.97–2.94) |
| Value and enjoyment of PE | | | | |
| High | 37.1 | 1.00 | 41.8 | 1.00 |
| Medium | 52.4 | 1.36 (1.03–1.78) | 50.1 | 1.37 (1.01–1.85) |
| Low | 10.5 | 1.15 (.73–1.81) | 8.1 | 1.79 (1.08–2.98) |

| | | | | |
|----------------|------|-------------------|------|------------------|
| PE grade | | | | |
| Excellent | 17.3 | 1.00 | 27.8 | 1.00 |
| Good | 46.5 | 2.01 (1.40–2.90) | 48.8 | 1.48 (1.05–2.10) |
| Pass | 30.6 | 3.00 (2.02–4.43) | 19.5 | 1.46 (.96–2.21) |
| Fail | 5.6 | 5.47 (2.81–10.66) | 3.9 | 1.63 (.81–3.28) |
| Type of school | | | | |
| Private | 25.5 | 1.00 | 26.5 | 1.00 |
| Public | 74.5 | 1.22 (.92–1.62) | 73.5 | 1.39 (1.00–1.93) |

Abbreviations: PE, physical education; LTPA, leisure-time physical activity.

Table 3 Adjusted Odds Ratios (AORs) for MVPA by Gender

| | Girls (n = 654) | | Boys (n = 1052) | |
|---|-----------------|------------------|-----------------|-----------------|
| | % | AOR (CI) | % | AOR (CI) |
| Age | | | | |
| 12–14 | 59.2 | 1.00 | 59.3 | 1.00 |
| 15–17 | 40.8 | .67 (.46–.97) | 40.7 | .78 (.54–1.11) |
| BMI | | | | |
| Normal weight | 80.9 | 1.00 | 70.6 | 1.00 |
| Underweight | 10.7 | .86 (.49–1.49) | 9.7 | .81 (.47–1.40) |
| Overweight | 4.7 | 1.31 (.60–2.87) | 9.6 | .88 (.51–1.51) |
| Obese | 3.7 | 2.93 (1.12–7.70) | 10.1 | .44 (.28–.72) |
| Perceived health | | | | |
| Good/very good | 96.5 | 1.00 | 98.0 | 1.00 |
| Bad/very bad | 3.5 | .48 (.19–1.25) | 2.0 | .87 (.30–2.51) |
| Physical self-perceptions | | | | |
| High | 43.7 | 1.00 | 62.5 | 1.00 |
| Medium | 52.1 | .75 (.52–1.08) | 33.7 | .48 (.34–.67) |
| Low | 4.1 | .73 (.29–1.81) | 3.8 | .71 (.30–1.64) |
| Health-related participation motives | | | | |
| High | 56.4 | 1.00 | 59.7 | 1.00 |
| Medium | 41.3 | .38 (.26–.54) | 37.8 | .55 (.38–.77) |
| Low | 2.3 | .23 (.07–.80) | 2.5 | .39 (.16–.94) |
| Alcohol | | | | |
| No | 64.7 | 1.00 | 68.6 | 1.00 |
| Yes | 35.3 | 1.38 (.90–2.11) | 31.4 | 1.35 (.89–2.04) |
| Smoking | | | | |
| No | 86.1 | 1.00 | 90.0 | 1.00 |
| Yes | 13.9 | 1.18 (.68–2.05) | 10.0 | 1.22 (.68–2.20) |
| Parental attitudes | | | | |
| They have encouraged me | 83.9 | 1.00 | 84.1 | 1.00 |
| They have pushed me to take part | 2.1 | 1.88 (.53–6.64) | 2.3 | .67 (.26–1.72) |
| They have not cared | 9.9 | .97 (.54–1.76) | 10.7 | .52 (.32–.84) |
| They have set barriers/obstacles | 4.0 | 1.73 (.70–4.32) | 2.9 | 1.41 (.46–4.32) |
| Friends' attitudes | | | | |
| They have encouraged me | 77.7 | 1.00 | 74.1 | 1.00 |
| They have pushed me to take part | 2.3 | .62 (.21–1.86) | 3.8 | .74 (.34–1.59) |
| They have not cared | 18.3 | .47 (.29–.74) | 19.6 | .85 (.58–1.26) |
| They have set barriers/obstacles | 1.7 | .42 (.11–1.71) | 2.5 | 1.86 (.52–6.67) |
| Father's LTPA | | | | |
| Currently | 33.8 | 1.00 | 35.1 | 1.00 |
| Previously | 51.1 | 1.24 (.84–1.83) | 53.9 | .86 (.58–1.27) |
| Never | 15.1 | .73 (.40–1.34) | 11.0 | .92 (.51–1.65) |
| Mother's LTPA | | | | |
| Currently | 26.0 | 1.00 | 21.8 | 1.00 |
| Previously | 44.5 | .82 (.53–1.26) | 43.6 | .91 (.56–1.45) |
| Never | 29.5 | .80 (.48–1.34) | 34.6 | .62 (.38–1.02) |
| Value and enjoyment of PE | | | | |

| | | | | |
|----------------|------|-----------------|------|------------------|
| High | 45.9 | 1.00 | 45.8 | 1.00 |
| Medium | 45.9 | 1.20 (.82–1.75) | 47.3 | .80 (.55–1.16) |
| Low | 8.3 | 1.39 (.70–2.76) | 6.8 | .98 (.50–1.95) |
| PE grade | | | | |
| Excellent | 24.8 | 1.00 | 30.8 | 1.00 |
| Good | 49.1 | .54 (.35–.83) | 48.1 | .55 (.37–.84) |
| Pass | 23.6 | .37 (.22–.62) | 18.0 | .55 (.34–.91) |
| Fail | 2.6 | .29 (.10–.92) | 3.1 | .24 (.11–.57) |
| Type of school | | | | |
| Private | 28.0 | 1.00 | 28.4 | 1.00 |
| Public | 72.0 | 1.24 (.84–1.83) | 71.6 | 1.53 (1.07–2.20) |

Abbreviations: PE, physical education; MVPA, moderate-to-vigorous physical activity; LTPA, leisure-time physical activity.