DIGITAL ACCESS TO
SCHOLARSHIP AT HARVARD
DASH.HARVARD.EDU

HARVARD LIBRARY
Office for Scholarly Communication

Perceived and Police-Reported Neighborhood Crime: Linkages to Adolescent Activity Behaviors and Weight Status

The Harvard community has made this article openly available. **Please share** how this access benefits you. Your story matters

Citation	Forsyth, Ann, Melanie Wall, Tse Choo, Nicole Larson, David Van Riper, and Dianne Neumark-Sztainer. 2015. "Perceived and Police-Reported Neighborhood Crime: Linkages to Adolescent Activity Behaviors and Weight Status." Journal of Adolescent Health 57 (2) (August): 222–228. doi:10.1016/j.jadohealth.2015.05.003. http://dx.doi.org/10.1016/j.jadohealth.2015.05.003.
Published Version	doi:10.1016/j.jadohealth.2015.05.003
Citable link	http://nrs.harvard.edu/urn-3:HUL.InstRepos:29663438
Terms of Use	This article was downloaded from Harvard University's DASH repository, and is made available under the terms and conditions applicable to Open Access Policy Articles, as set forth at http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#OAP

Perceived and Police Reported Neighborhood Crime: Linkages to Adolescent Activity Behaviors and Weight Status

Ann Forsyth, MA, PhD[a], **Melanie Wall, PhD**[b], **Tse Choo, MPH**[c], **Nicole Larson, PhD, MPH, RDN**[d], **David Van Riper, MA**[e], and **Dianne Neumark-Sztainer, MPH, PhD**[d]

Ann Forsyth: aforsyth@gsd.harvard.edu; Melanie Wall: mmwall@columbia.edu; Tse Choo: tjc2143@columbia.edu; Nicole Larson: larsonn@umn.edu; David Van Riper: vanriper@umn.edu; Dianne Neumark-Sztainer: Neumark@epi.umn.edu

[a]Department of Urban Planning and Design, Harvard University, 48 Quincy Street, Cambridge, MA 02138, USA, Phone: 1 617-496-3587, Fax: 1 617-496-1292

[b]Departments of Biostatistics and Psychiatry, Columbia University, New York, USA

[c]Research Foundation for Mental Hygiene, New York, USA

[d]Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, USA

[e]Minnesota Population Center, University of Minnesota, USA

Abstract

Purpose—Inadequate physical activity and obesity during adolescence are areas of public health concern. Questions exist about the role of neighborhoods in the etiology of these problems. This research addressed the relationships of perceived and objective reports of neighborhood crime to adolescent physical activity, screen media use, and BMI.

Methods—Socioeconomically and racially/ethnically diverse adolescents (N=2,455, 53.4% female) from 20 urban, public middle and high schools in Minneapolis/St. Paul, Minnesota responded to a classroom survey in the EAT 2010 (Eating and Activity in Teens) study. Body mass index (BMI) was measured by research staff. Participants' mean age was 14.6 (SD=2.0); 82.7% represented racial/ethnic groups other than non-Hispanic white. Linear regressions examined associations between crime perceived by adolescents and crime reported to police and the outcomes of interest (BMI z-scores, physical activity, and screen time). Models were stratified by gender and adjusted for age, race/ethnicity, socioeconomic status, and school.

Results—BMI was positively associated with perceived crime among girls and boys and with reported crime in girls. For girls, there was an association between higher perceived crime and increased screen time; for boys, between higher reported property crime and reduced physical activity. Perceived crime was associated with reported crime, both property and personal, in both genders.

Correspondence to: Ann Forsyth, aforsyth@gsd.harvard.edu.

Conclusions—Few prior studies of adolescents have studied the association between both perceived and reported crime and BMI. Community-based programs for youth should consider addressing adolescents' safety concerns along with other perceived barriers to physical activity. Interventions targeting actual crime rates are also important.

Keywords

Adolescents; perceived and actual crime; neighborhoods; body mass index; screen time; physical activity

---

Does crime limit physical activity in urban, ethnically diverse, low-income adolescents? Which is more important in predicting physical activity, sedentary behavior, and Body Mass Index (BMI)—perceived crime, measured via survey, or crime reported to police? The current study, conducted among adolescents in Minnesota, examined relationships between perceived crime; reported person and property crime rates; and physical activity, screen media use, and BMI.

Foster and Giles-Corti [1] provide a thorough review of the literature on crime, physical activity, and BMI, demonstrating that studies examining associations between crime and physical activity among adults have had mixed results (also [2, 3]). Associations were stronger in some studies for vulnerable groups such as women and older adults; Diez Roux and Mair suggest that more recent studies show stronger associations [3].

Among children and adolescents, most studies have focused on either perceived crime or reported crime but not both [4, 5]. Studies that did examine this relationship in adolescents have, in general, found mixed associations between perceived lack of safety, reported crime, and physical activity in adolescents. Associations with physical activity were stronger among girls, however.

Gomez et al. [6] examined 177 7th graders in San Antonio, mostly Mexican Americans. Girls' outdoor physical activity was negatively associated with both perceived crime and reported violent crime. Ries et al. [7] studied 329 Baltimore high school students. Neither objectively measured nor perceived crime were associated with park use or physical activity. Rossen et al. [8] studied 365 Baltimore children aged 8–13. High levels of audited neighborhood incivilities led to higher levels of perceived crime. However, those living on blocks with above median incivilities were far more likely to walk to school. Kneeshaw-Price et al. [9] explored physical activity in 145 6–11 year old children in San Diego finding correlations among field observed incivilities, parents' perceptions of crime, and prior crime victimization. Police-reported crime was the only crime measure (negatively) associated with physical activity. In a study of a larger population, Janssen [10], using data from a Canadian national sample of 14,125 youth aged 11–15, found youth were less likely to be active outside school for at least 4 hours a week in areas with higher perceived crime and higher reported crime against persons.

There have been fewer studies that have also examined BMI and both perceived and reported crime. Studies of perceived or reported crime and sedentary behaviors have mixed findings—some finding associations [11] but others not [12, 13]. Carroll-Scott et al. [14]

examined reported and perceived crime in relation to BMI, physical activity, sedentary behavior (screen time), and healthy eating in a sample of fifth and sixth grade students (N=1,048). Property crimes were associated with higher BMI but not other outcomes. Larson et al. [15] conducted a comprehensive analysis of social and environmental constructs and obesity in adolescents, using the same data set as is used in the current study, and found that girls who perceived a lack of safety in their neighborhoods had higher BMIs; however, a dichotomized measure of neighborhood crime (reported to the police) showed no association with physical activity or BMI in the study sample (also [16]). The current study builds upon this previous work by examining the role of crime in more detail. Specifically, more measures of crime are included; associations with both perceived and reported crimes are examined more fully; and both physical and sedentary activity are examined, in addition to BMI, as outcomes.

The multifaceted assessment undertaken in the current study was designed to help clarify the association of crime to BMI among adolescents, including the role of physical activity and sedentary behavior. We hypothesized in this study that perceived crime would be associated with adolescent obesity, reduced physical activity, and higher screen time, while associations with reported crime would be weaker. While reported or actual crime does affect perceptions, so do media representations, perceptions of incivilities (e.g. graffiti), and individual attitudes [17, 18]. We thus further hypothesized that because of the complex causal pathways linking reported and perceived crime [17] they would not be strongly associated with each other.

Methods

Locations and Process

Data were collected in EAT 2010 (Eating and Activity in Teens), a population-based study examining dietary intake, physical activity, weight control behaviors, weight status, and factors associated with these outcomes [15, 16]. The study included adolescents from 20 public middle schools and high schools in the Minneapolis/St. Paul metropolitan area of Minnesota, in socioeconomically and racially/ethnically diverse communities. In all, 2,715 adolescents completed anthropometric measures and classroom surveys, including measures of perceived neighborhood safety, during the 2009–2010 academic year; of these, 2,455 lived in neighborhoods within the Minneapolis and St. Paul city limits for which we had data on reported crime (personal and property) and answered questions about perceived crime, constituting the final sample [19, 20].

Trained research staff administered surveys during two class periods of 45–50 minutes each. The survey was first pilot tested with a different sample of 129 middle school and high school students to examine the test-retest reliability of measures over a one-week period. All study procedures were approved by the University of Minnesota's Institutional Review Board and by participating school districts. Adolescents were given the opportunity to assent only if their parent/guardian did not return a signed consent form indicating their refusal to have their child participate [19, 20].

Among adolescents who were at school on the days of survey administration, 96.3% had parental consent and chose to participate (N=2,793); this total group was demographically similar to the 2,455 students for which we had crime data and anthropometric measures. Mean participant age was 14.6 years (SD=2.0); 42.8% were in middle school (6th–8th grades) and 57.2% were in high school (9th–12th grades). Participants were equally divided by gender (53.4% girls). Racial/ethnic backgrounds were: 17.3% white, 29.5% African American or black, 21.0% Asian American, 17.0% Hispanic, 3.5% Native American, and 11.6% mixed or other. Of participants, 45.2% were on public assistance, 74.3% reported that they qualified for free or reduced lunch, 39.0% had at least one parent who graduated college, resulting in 62.3% being identified as low or low-medium SES.

Research staff measured adolescents' height and weight in a private area at each school. Height was assessed to the nearest 0.1 cm using a Shorr Board and weight to the nearest 0.1 kg using a calibrated scale. BMI was calculated and converted to z-scores, standardized for gender and age.

Neighborhood Environment Assessment

A Geographic Information System (GIS) was used to assess crime reported to police. We obtained Uniform Crime Report (UCR) crime counts for Minneapolis and St. Paul in 2010. We divided these into crimes against persons (homicide, rape, assault, robbery) and against property (burglary, theft [automobile and other], and arson). The St. Paul data were generally collected for roughly 0.5 mile (805 meter) square grids measuring approximately 65 hectares (ha). One hectare is approximately 2.2 acres. Because of variety in the street pattern, they ranged from 17 ha to 381 ha (mean = 68 ha; SD = 37). The Minneapolis data were by neighborhoods ranging from 48 ha to 387 ha (mean = 170 ha; SD = 77). This paper uses continuous crime rates standardized by size of neighborhood (i.e. crimes per one hectare per year). Home and school addresses were geocoded using ArcGIS Version 9.3.1, which was also used to join crime counts for 2010 to neighborhood boundaries (Esri, Redlands, California, 2009).

Survey Measures

Adolescents were asked two questions from the Neighborhood Environment Walkability Scale (NEWS) [21–23] related to the neighborhood where they had lived for the majority of the past year: "The crime rate in my neighborhood makes it unsafe to go on walks **during the day**" and the same question ending in "**during the night**" (Test-retest reliability: r(day)=0.57, r(night)=0.65). The validity of the NEWS has been previously described [21–23]. Answers were on a 4-point Likert scale from strongly and somewhat disagree to somewhat and strongly agree.

Participants' perceptions of crime in their neighborhoods were divided into three levels. Likert items were both dichotomized into disagree and strongly disagree vs. agree and strongly agree. Those who agreed that their neighborhoods were unsafe to walk in during the day (regardless of their answer to the night question) were considered to have the highest level of perceived crime; those who felt safe walking in their neighborhoods during the day, but agreed it was not safe at night, were designated to the next highest; and those who

disagreed with both statements (day or night) about whether their neighborhoods were unsafe had the lowest level of perceived crime.

Physical activity was measured by separately asking participants how many hours they spent doing strenuous, moderate, and mild exercise in a typical week, with several examples of each level of activity provided [24]. Response categories were none, less than 0.5 hours, 0.5–2 hours, 2.5–4 hours, 4.5–6 hours, and 6 or more hours. Responses for each of three levels of activity (mild, moderate, and strenuous) were scored using the mid-point of each category 0, 0.3, 1.3, 3.3, 5.3, and for the highest category choosing a reasonable upper value of 8, and then summed to obtain total hours (Test-retest reliability: r=0.74). Screen media use was measured using questions adapted from previous studies [25] by asking participants to indicate the usual number of leisure-time hours they spent playing video games (played while sitting); using a computer (not for homework); and watching television, DVDs or videos, and this was asked separately for both weekdays and weekend days [25, 26]. Response categories for each question were 0 hours, 0.5 hour, 1 hour, 2 hours, 3 hours, 4 hours, and 5 or more hours; these responses were scored 0, 0.5, 1, 2, 3, 4, and 6 hours per week, and weighted to create a continuous variable representing total weekly hours of screen time (Test-retest reliability: r=0.86).

Socio-demographic characteristics were self-reported by adolescent participants, including their gender, age, race/ethnicity, grade level, and measures of socioeconomic status (SES). Ethnicity/race was assessed with the question: "Do you think of yourself as….?(1) white, (2) black or African American, (3) Hispanic or Latino, (4) Asian American, (5) Native Hawaiian or Pacific Islander, (6) American Indian or Native American, or (7) other" (Test-retest agreement: 98–100%). The few adolescents who reported "Hawaiian or Pacific Islander," or did not report their ethnicity/race, were coded as "mixed or other." SES was determined primarily using the higher education level of either parent. To address possible misclassification as high SES for participants facing economic distress, an algorithm was developed that also took into account family eligibility for public assistance, eligibility for free or reduced-cost school meals, and parental employment status [19, 27, 28].

Statistical Analysis

Pearson correlations were calculated between the three outcome variables to assess their associations with each other. Associations between perceived and reported crime (person, property, and total) were assessed by regressing continuous reported crime (crime per hectare) on the three categories of perceived crime as the explanatory variable. A linear trend test across the three categories of perceived crime was performed for each type of reported crime. Effect modification of this perceived vs. reported association was tested by including interactions separately with gender, race, and SES. Because the reported crime variables were right skewed, values above the 95th percentile were censored (i.e. set to equal the 95th percentile) to reduce the influence of outliers on calculating means and regression coefficients. A non-parametric test (Kruskal Wallis) was also used to test associations to ensure results were robust to skewed values. Spearman correlations were calculated between each reported and perceived crime variable in order to provide a standardized effect size measure for comparing associations.

To test associations between outcome variables (BMI z-scores, physical activity, and screen time) and perceived and reported crime simultaneously, separate regressions were performed for each outcome including both the perceived and reported crime as predictors controlling for age, race, SES, and school (to account for unmeasured confounders associated with clustering of students within the 20 schools). All analyses were stratified by gender. Additional regression models were fit including only perceived or reported crime as predictors separately to examine the possibility of over-control. Individuals with data missing for a particular variable were removed from analyses involving that variable. However, less than 3% of participants living in neighborhoods with reported crime information had incomplete data for any analysis performed. In order to investigate the potential specificity of the type of crime, regression analyses were also rerun separately, replacing total reported crime with property and personal crime rates individually. All analyses were carried out in SAS 9.2.

Results

Perceived and Reported Crime

Reported total crime in neighborhoods varied from 0.0 to 11.1 crimes per hectare per year, averaging 1.7 (SD=0.97), with a mean for person crime of 0.4 crimes per hectare per year (s.d. 0.30) and mean for property crime of 1.3 (SD=0.73). Perception that the neighborhood was unsafe was reported by 42.5% of boys (22.7% during the night only, and 19.8% during the day) and 51.1% of girls (24.6% during the night only, and 26.6% during the day).

A significant trend relationship (p<.0001) was found between adolescent perception of lack of neighborhood safety and reported crime (i.e. personal, property, and total) for boys and girls (Table 1). Boys who felt the neighborhood was unsafe during the day lived in neighborhoods with an average of 2.0 total reported crimes per hectare per year; for girls the figure was 1.96. Boys who perceived no worry about crime lived in neighborhoods with an average of 1.57 reported crimes; for girls the number was 1.53. There were no differences in the trend association for boys as compared to girls, and the trend between perception and person crime was not different from the trend with property crimes. Neither race/ethnicity nor SES significantly modified the observed relationships. Findings did not differ when results were reanalyzed using non-parametric tests robust to skewness.

Crime, BMI, Physical Activity, and Screen Time

Perceived crime levels, specifically the neighborhood being unsafe during the day, were positively associated with BMI z-scores in both girls and boys (Table 2). Reported crime was associated with higher BMI z-scores in girls, but not in boys. For example, in girls as the reported crime rate increased by 1 additional incident per hectare per year, BMI z-score was, on average, 0.07 points higher, after controlling for perceived crime and demographics.

Neither total reported crime nor perceived crime were significantly associated with physical activity, in boys or girls. Among girls, screen time was positively associated with perceived crime (after controlling for reported crime and socioeconomic factors). Girls who perceived the neighborhood to be unsafe during the day had 4.8 more hours of screen time in a week

than girls who had no worries about safety in the neighborhood. There were no other statistically significant associations between crime and screen time in either boys or girls.

The results were the same in analyses that replaced total reported crime with either personal or property crime. The one exception was that higher property crime was associated with reduced physical activity in boys (beta = −0.539, SE = 0.247, p-value = 0.0296) (Tables 3 and 4). Results found from fitting models with perceived and reported crime included separately were qualitatively the same. The only difference was that in boys the negative effect that total reported crime had on physical activity reached statistical significance (p<.05) whereas in the mutually controlled results the p-value was 0.079. The simple correlation between the three outcome variables (BMI, activity, and screen time) with each other did not reach statistical significance (p>0.05) in boys or girls (see Table 5).

Discussion

The contribution of this study is to examine BMI, physical activity, and screen media use for (a) adolescents boys and girls, (b) in relation to perceived and reported crime, with a (c) relatively large and (d) an ethnically and socioeconomically diverse sample. Perceived crime was analyzed for both day and night and reported crime analyzed separately for crimes against persons and property. Only a few studies to date have examined the relationship between adolescent physical activity and/or BMI, and both perceived and reported crime in adolescents [6–10, 14]. These have had varied findings, although relationships between perceived and/or reported crime and girls' physical activity are typically stronger than those for boys. BMI, an important health outcome and one that is more reliably measured than physical activity, has not been much studied [14, 15].

It was initially hypothesized that because of the commonly found lack of association between perceived and reported crime, perceived crime would be associated with adolescent BMI, lower physical activity, and higher screen time, but that reported crime would not be as strongly associated with these outcomes [17, 18]. However, perceived and reported crime were significantly positively associated with each other in this study. This echoes the work of Janssen, [10] taking it further by disaggregating by gender. Among girls and boys in this multi-ethnic group, there was also a consistent association between perceived crime and BMI. For girls, BMI was also associated with reported crime and screen time was associated with perceived crime. There were no associations between perceived crime and physical activity in either gender. Only for boys was one measure of reported crime (property crimes) associated with reduced physical activity.

The association between perceived crime and higher BMI among girls and boys but the lack of association between perceived crime and physical activity warrants discussion. For girls, reported crime was associated with higher BMI; for boys, reported property crime was associated with reduced physical activity. Thus, while weaker, there were associations between reported crime and outcomes. It could also be that physical activity was reported inconsistently by the adolescents, contributing to the weak findings. In addition, participants were asked about total physical activity or exercise, and also screen time, that could have been carried out in a variety of locations, not just their neighborhood. Finally,

neighborhoods are very complex. Neighborhoods with higher crime levels may have unmeasured elements that affect the findings.

This study found that neighborhood crime perceived by adolescents and reported to police were significantly associated with each other. Many earlier studies have reported modest associations between perceived and reported crime. A review by Wilcox et al. [18] proposed that rather than reflecting reported crime rates, perceived crime may be most strongly associated with a person's socio-demographics (e.g., female, elderly, poor, and non-White people perceive higher risk), neighborhood characteristics (e.g., lower social cohesion, higher disorder), and media reporting, among other factors. However, Janssen's [10] large Canadian study found such an association between perceived and reported crime. This is worthy of further investigation.

This study has several strengths. It examines both perceived and reported crime rates in terms of three different outcome measures—BMI, physical activity, and screen time. With the exception of recent work by Janssen [10], it also examined a much larger sample than earlier studies that had looked at both perceived and reported crime. Its focus on multi-ethnic, mostly low-income adolescents at high risk for obesity, and separate analyses by gender also adds to its significance for targeting interventions. Finally, the study examined perceived crime in the day and night separately, finding positive associations between BMI and perceived daytime but not nighttime crime for both genders; for girls perceived daytime crime was also associated with sedentary behavior. Many studies create indicators of perceived safety (traffic, crime), or of all perceived crime; disaggregated measures can help identify more specific policy responses.

Several limitations should be taken into account in interpreting the findings. Crime rates or reports were available for different neighborhood geographies in St. Paul and Minneapolis— in St. Paul a more consistent grid and in Minneapolis more irregular areas. While the sizes were comparable, the modifiable areal unit problem may have been at play. Physical activity and screen time were self-reported, leading to potential problems with recall. Finally, the measure of physical activity used the term 'exercise,' which may have focused attention on leisure rather than utilitarian physical activity often conducted in neighborhoods.

The study provides insights about the association between perceived crime and BMI for boys and girls, and reported crime and BMI for girls, of relevance to public health professionals. Given the substantial problems with obesity in lower income communities it will be worthwhile to conduct more large-scale studies in these important groups; previous studies were either small or were nation-wide. Better measures of screen time and physical activity, usable in large-scale studies, would help clarify whether the modest associations found reflect the actual situation or problems with recall.

In terms of public health practice, community-based programs for youth should consider addressing neighborhood safety perceptions along with other perceived barriers to physical activity. However, reported or actual crime was also significant for BMI status among girls, and for physical activity among boys, so work to reduce actual neighborhood crime rates is also important. Such activities could be enhanced by collaborations with schools and with

public safety and urban planning professionals. Finally, it is worth considering how to increase physical activity within the home.

Acknowledgements

Abbreviations

BMI	Body Mass Index
EAT	Eating and Activity in Teens
GIS	Geographic Information System
NEWS	Neighborhood Environment Walkability Survey
SES	Socioeconomic Status
UCR	Uniform Crime Report

References

1. Foster S, Giles-Corti B. The built environment, neighborhood crime and constrained physical activity: an exploration of inconsistent findings. Prev Med. 2008; 47:241–251. [PubMed: 18499242]

2. Lovasi GS, Hutson MA, Guerra M, et al. Built environments and obesity in disadvantaged populations. Epidemiol Rev. 2009; 31:7–20. [PubMed: 19589839]

3. Diez Roux AV, Mair C. Neighborhoods and health. Ann N Y Acad Sci. 2010; 1186:125–145. [PubMed: 20201871]

4. Carver A, Timperio A, Crawford D. Playing it safe: the influence of neighbourhood safety on children's physical activity. A review. Health Place. 2008; 14:217–227. [PubMed: 17662638]

5. Ding D, Sallis JF, Kerr J, et al. Neighborhood environment and physical activity among youth a review. Am J Prev Med. 2011; 41:442–455. [PubMed: 21961474]

6. Gomez JE, Johnson BA, Selva M, et al. Violent crime and outdoor physical activity among inner-city youth. Prev Med. 2004; 39:876–881. [PubMed: 15475019]

7. Ries AV, Voorhees CC, Roche KM, et al. A quantitative examination of park characteristics related to park use and physical activity among urban youth. J Adolesc Health. 2009; 45:S64–S70. [PubMed: 19699439]

8. Rossen LM, Pollack KM, Curriero FC, et al. Neighborhood incivilities, perceived neighborhood safety, and walking to school among urban-dwelling children. J Phys Act Health. 2011; 8:262–271. [PubMed: 21415453]

9. Kneeshaw-Price SH, Saelens BE, Sallis JF, et al. Neighborhood crime-related safety and its relation to children's physical activity. J Urban Health. 2015

10. Janssen I. Crime and perceptions of safety in the home neighborhood are independently associated with physical activity among 11-15 year olds. Prev Med. 2014; 66:113–117. [PubMed: 24963893]

11. Nelson MC, Gordon-Larsen P, Song Y, et al. Built and social environments associations with adolescent overweight and activity. Am J Prev Med. 2006; 31:109–117. [PubMed: 16829327]

12. Evenson KR, Murray DM, Birnbaum AS, et al. Examination of perceived neighbourhood characteristics and transportation on changes in physical activity and sedentary behavior: The Trial of Activity in Adolescent Girls. Health Place. 2010; 16:977–985. [PubMed: 20615746]

13. Veitch J, Timperio A, Crawford D, et al. Is the Neighbourhood Environment Associated with Sedentary Behaviour Outside of School Hours Among Children? Ann Behav Med. 2011; 41:333–341. [PubMed: 21336879]

14. Carroll-Scott A, Gilstad-Hayden K, Rosenthal L, et al. Disentangling neighborhood contextual associations with child body mass index, diet, and physical activity: the role of built, socioeconomic, and social environments. Soc Sci Med. 2013; 95:106–114. [PubMed: 23642646]

15. Larson NI, Wall MM, Story MT, et al. Home/family, peer, school, and neighbourhood correlates of obesity in adolescents. Obesity (Silver Spring). 2013; 21:1858–1869. [PubMed: 23512596]

16. Graham DJ, Wall MM, Larson N, et al. Multicontextual correlates of adolescent leisure-time physical activity. Am J Prev Med. 2014; 46:605–616. [PubMed: 24842737]

17. Lorenc T, Clayton S, Neary D, et al. Crime, fear of crime, environment, and mental health and wellbeing: mapping review of theories and causal pathways. Health Place. 2012; 18:757–765. [PubMed: 22542441]

18. Wilcox P, Quisenberry N, Jones S. The built environment and community crime risk interpretation. J Res Crime Delinquency. 2003; 40:322–345.

19. Wall MM, Larson NI, Forsyth A, et al. Patterns of obesogenic neighborhood features and adolescent weight: a comparison of statistical approaches. Am J Prev Med. 2012; 42:e65–e75. [PubMed: 22516505]

20. Forsyth A, Wall M, Larson N, et al. Do adolescents who live or go to school near fast-food restaurants eat more frequently from fast-food restaurants? Health Place. 2012; 18:1261–1269. [PubMed: 23064515]

21. Saelens BE, Sallis JF, Black J, et al. Measuring perceived neighborhood environment factors related to walking/cycling. Ann Behav Med. 2002; 93:1552–1558.

22. Saelens BE, Sallis JF, Black JB, et al. Neighborhood-based differences in physical activity: An environment scale evaluation. Am J Public Health. 2003; 93:1552–1558. [PubMed: 12948979]

23. Cerin E, Saelens BE, Sallis JF, et al. Neighborhood Environment Walkability Scale: validity and development of a short form. Med Sci Sports Exerc. 2006; 38:1682–1691. [PubMed: 16960531]

24. Godin G, Shephard RJ. A simple method to assess exercise behavior in the community. Can J Appl Sport Sci. 1985; 10:141–146. [PubMed: 4053261]

25. Gortmaker SL, Peterson K, Wiecha J, et al. Reducing obesity via a school-based interdisciplinary intervention among youth: Planet Health. Arch Pediatr Adolesc Med. 1999; 153:409–418. [PubMed: 10201726]

26. Nelson MC, Neumark-Sztainer D, Hannan PJ, et al. Longitudinal and secular trends in physical activity and sedentary behavior during adolescence. Pediatrics. 2006; 118:e1627–e1634. [PubMed: 17142492]

27. Sherwood NE, Wall M, Neumark-Sztainer D, et al. Effect of socioeconomic status on weight change patterns in adolescents. Prev Chronic Dis. 2009; 6:A19. [PubMed: 19080025]

28. Neumark-Sztainer D, Wall MM, Larson N, et al. Secular trends in weight status and weight-related attitudes and behaviors in adolescents from 1999 to 2010. Prev Med. 2012; 54:77–81. [PubMed: 22024221]

Implications and Contribution

Addressing the relationships of both perceived and objective reports of neighborhood crime with adolescent physical activity, screen media use, and obesity, higher BMI among girls and boys was positively associated with crime. Perceived crime was directly associated with reported crime, both property and personal, in this diverse sample.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1

Mean Numbers of Crimes per Hectare in 2010 for Different Levels of Perceived Crime among Adolescents in Minneapolis and St. Paul

		Perceived Crime				
	Reported Crimes[a]	No Worry About Safety	Unsafe During Night Only	Unsafe During Day[b]	p-value[c]	Spearman Correlation (p-value)
	N (%)	658 (57.5%)	260 (22.7%)	227 (19.8%)		
Boys	Total Crime mean (STD)	1.54 (0.88)	1.85(0.87)	1.95 (0.86)	<.001	0.2140 (<.0001)
	Person Crime mean (STD)	0.32 (0.27)	0.41 (0.28)	0.47 (0.28)	<.001	0.2021 (<.0001)
	Property Crime mean (STD)	1.20 (0.63)	1.43(0.62)	1.47 (0.60)	<.001	0.2281 (<.0001)
		640 (48.9%)	322 (24.6%)	348 (26.6%)		
Girls	Total Crime mean (STD)	1.50 (0.86)	1.77(0.88)	1.93 (0.81)	<.001	0.2271 (<.0001)
	Person Crime mean (STD)	0.31 (0.26)	0.39 (0.28)	0.47 (0.26)	<.001	0.2084 (<.0001)
	Property Crime mean (STD)	1.18 (0.62)	1.38 (0.63)	1.46 (0.57)	<.001	0.2610 (<.0001)

[a] Unit of measurement for reported crimes (those reported to the police) is crimes per hectare in 2010. Person crime includes homicide, rape, assault, and robbery; property crime includes burglary, theft (automobile and other), and arson.

[b] Most (n=527, 91.7%) of this group felt unsafe both during the day and night.

[c] Test for a linear trend in reported crime across different levels of perceived crime using ANOVA

Table 2

Reported Crime and Perceived Crime Associations with BMI Z-scores, Physical Activity, and Screen Time in Adolescent Boys (N=1145) and Girls (N=1310) among Adolescents in Minneapolis and St. Paul, 2010

	Outcome	Reported Crime[a]			Perceived Unsafe During Night Only vs Always Safe[b]			Perceived Unsafe During Day vs Always Safe[b]		
		β[c]	SE	p-value[d]	β[c]	SE	p-value[d]	β[c]	SE	p-value[d]
Boys	BMI Z-score	0.004	0.042	0.9189	-.093	0.086	0.2792	**0.210**	**0.092**	**0.0227**
	Physical Activity	-.317	0.177	0.0733	-.360	0.359	0.3163	-.293	0.382	0.4434
	Screentime	-.152	1.035	0.8830	1.744	2.098	0.4060	4.335	2.234	0.0526
Girls	BMI Z-score	**0.072**	**0.035**	**0.0391**	0.061	0.068	0.3660	**0.171**	**0.068**	**0.0122**
	Physical Activity	0.042	0.155	0.7894	0.193	0.303	0.5238	-.106	0.304	0.7281
	Screentime	0.381	0.843	0.6517	1.808	1.646	0.2721	**4.751**	**1.652**	**0.0041**

[a] Reported Crime combines personal and property crimes

[b] Comparison group is respondents with no perceived worries about safety

[c] Regression coefficients from model simultaneously include both reported and perceived crime and also control for age, race, SES, and school attended

[d] Calculated using two-sided t-tests of coefficients from linear regression

Table 3

Property Crime Only and Perceived Crime Associations with BMI Z-scores, Physical Activity, and Screen Time in Adolescent Boys (N=1145) and Girls (N=1310) among Adolescents in Minneapolis and St. Paul, 2010

	Outcome	Reported Property Crime			Perceived Unsafe During Night Only vs Always Safe[a]			Perceived Unsafe During Day vs Always Safe[a]		
		β[c]	SE	p-value[d]	β[c]	SE	p-value[d]	β[c]	SE	p-value[d]
Boys	BMI Z-score	0.022	0.059	0.7125	-.096	0.086	0.2641	**0.207**	**0.092**	**0.0244**
	Physical Activity	**-.539**	**0.247**	**0.0296**	-.339	0.359	0.3444	-.285	0.381	0.4554
	Screen time	-.089	1.448	0.9512	1.721	2.099	0.4123	4.305	2.229	0.0537
Girls	BMI Z-score	**0.098**	**0.048**	**0.0408**	0.061	0.068	0.3670	**0.174**	**0.068**	**0.0105**
	Physical Activity	0.133	0.214	0.5334	0.179	0.303	0.5555	-.122	0.304	0.6869
	Screen time	0.807	1.161	0.4871	1.754	1.646	0.2866	**4.699**	**1.647**	**0.0044**

[a] Comparison group is respondents with no perceived worries about safety

[b] Regression coefficients from model simultaneously include both reported and perceived crime and also control for age, race, SES, and school attended

[c] Calculated using two-sided t-tests of coefficients from linear regression

Table 4

Person Crime Only and Perceived Crime Associations with BMI Z-scores, Physical Activity, and Screen Time in Adolescent Boys (N=1145) and Girls (N=1310) among Adolescents in Minneapolis and St. Paul, 2010

	Outcome	Person Crime			Perceived Unsafe During Night Only vs Always Safe[a]			Perceived Unsafe During Day vs Always Safe[a]		
		β[c]	SE	p-value[d]	β[c]	SE	p-value[d]	β[c]	SE	p-value[d]
Boys	BMI Z-score	0.003	0.136	0.9841	–.092	0.086	0.2829	**0.211**	**0.092**	**0.0226**
	Physical Activity	–.240	0.566	0.6719	–.426	0.359	0.2351	–.366	0.384	0.3409
	Screen time	–1.80	3.307	0.5858	1.830	2.093	0.3821	**4.495**	**2.242**	**0.0453**
Girls	BMI Z-score	**0.238**	**0.113**	**0.0363**	0.062	0.068	0.3578	**0.167**	**0.069**	**0.0152**
	Physical Activity	–.193	0.506	0.7037	0.218	0.302	0.4712	–.067	0.306	0.8271
	Screen time	–.034	2.749	0.9901	1.909	1.644	0.2457	**4.890**	**1.661**	**0.0033**

[a]Comparison group is respondents with no perceived worries about safety

[b]Regression coefficients from model simultaneously include both reported and perceived crime and also control for age, race, SES, and school attended

[c]Calculated using two-sided t-tests of coefficients from linear regression

Table 5

Pearson Correlations among Outcome Variables by Gender

	BMI with Activity	**BMI with Screen Time**	**Activity with Screen Time**
Boys	−0.038 (p=0.2026)	0.045 (p=0.1298)	−0.054 (p=0.0674)
Girls	0.043 (p=0.1191)	0.011 (p=0.6785)	−0.013 (p=0.6355)