This is the authors’ final peer reviewed (post print) version of the item published as:

Timperio, Anna, Salmon, Jo, Ball, Kylie, te Velde, Saskia J., Brug, Johannes and Crawford, David 2012, Neighborhood characteristics and TV viewing in youth : nothing to do but watch TV?, *Journal of science and medicine in sport*, vol. 15, no. 2, pp. 122-128.

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Neighborhood characteristics and TV viewing in youth:

nothing to do but watch TV?

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Total word count: 3,145

Abstract word count: 211

Tables: 3

Figures: 0

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Abstract

Objectives: Neighborhoods that discourage physical activity may encourage indoor activities such as television viewing; however few studies have examined associations between neighborhood
characteristics and sedentary activities. This study examined cross-sectional and longitudinal associations between perceived and objective measures of the physical and social neighborhood environment and TV viewing among children and adolescents.

**Design:** Cross-sectional and longitudinal

**Method:** Parents of 190 children and 169 adolescents completed questionnaire items regarding facilities for physical activity, neighborhood safety (general and traffic), social trust/cohesion, social networks and their child’s TV viewing in 2006. Adolescents self-reported their TV viewing. Objective measures of reported crime and neighborhood destinations, road connectivity and traffic exposure were also collected. Questions about TV viewing were repeated in 2008 (longitudinal sample: 157 children; 105 adolescents).

**Results:** In children, cul-de-sac density and reported crime were positively and parental agreement that their neighborhood has good sporting facilities was negatively associated with TV viewing in cross-sectional analyses. There were no longitudinal associations among children. In adolescents, number of sports options and parental agreement that there is so much traffic that it is difficult/unpleasant for their child to walk were negatively associated with TV viewing two years later.

**Conclusions:** Crime and a lack of quality sporting facilities or options may contribute to greater TV viewing among youth.

**Key words:** children, adolescents, environment, sedentary, longitudinal

**Introduction**

Television (TV) viewing has been linked to detrimental health and behavioural outcomes in youth. Australian children spend an average of 2.6 hours/day watching TV and estimates from other nations also point to high amounts of viewing. Guidelines recommending that children spend less than two hours per day watching TV and engaging in other screen behaviors have thus been developed in several countries, however many children exceed this. As TV viewing predominantly occurs within homes, most research has focused on identifying correlates of TV viewing within the home and family environment. However, consistent with social ecological theory, the broader
neighborhood environment may also be important. Aspects of the neighborhood environment (eg. availability of recreational facilities, access to destinations and traffic- and crime-related safety) are associated with physical activity among youth\textsuperscript{14} and it has been suggested that environments not conducive to physical activity have helped to create a generation of ‘indoor children’.\textsuperscript{15} It is therefore possible that neighborhoods that discourage physical activity may encourage other (sedentary) activities close to home or indoors, such as TV viewing.

Few studies have examined neighborhood correlates of TV viewing in youth, most examining different aspects of the neighbourhood environment. In children, TV viewing time has been negatively associated with perceptions of neighbourhood safety,\textsuperscript{16} positively associated with rates of burglary and larceny (in girls but not boys)\textsuperscript{17} and negatively associated with access to places, such as public open space, for physical activity.\textsuperscript{18,19} Another study found greater likelihood of exceeding guidelines for TV viewing among adolescents living in neighborhoods characterized by high crime, more places for physical activity, greater street connectivity and low socio-economic status,\textsuperscript{20} while Roemmich et al.\textsuperscript{19} found no associations with aspects of neighborhood design (intersections per street mile; street widths). In the only study to include a longitudinal study design, Veitch et al.\textsuperscript{18} found a negative association between parental satisfaction with local parks and playgrounds and children’s TV viewing two years later, however no cross-sectional or longitudinal associations were found with aspects of the social environment (social networks, social trust/cohesion, parental perception of crime or concern about ‘stranger danger’). The aim of the present study was to examine cross-sectional and longitudinal associations between perceived and objective measures of the physical and social neighborhood environment and TV viewing among children and among adolescents.

\textbf{Methods}

This study used data from the first (2006) and second (2008) follow-ups of children who participated in the Health, Eating and Play Study (HEAPS) in 2002/3.\textsuperscript{2,21} The study was approved by the Deakin University Ethics Committee, Department of Education and Training Victoria and Catholic Education Office.
The 2002/3 baseline sample included 613 prep-grade children (mean age 5.9 years) and 947 grade 5/6 children (mean age 11.2 years) recruited from 24 and 17 state or Catholic primary schools, respectively, within Greater Melbourne and Geelong. These schools were randomly selected from schools with enrolments greater than 200 from postcodes in the highest, middle and lowest quintiles of area-level socioeconomic status. Parents of 825 of these children (351 younger and 474 older children) agreed at that time to be re-contacted for further research and were subsequently invited to participate in the 2006 follow-up study. Of those invited, 215 families of younger and 200 families of older children provided written consent and data were collected from 210 and 197 families, respectively. Of these, 197 younger and 180 older children were invited to participate in the 2008 follow-up, and 189 and 145, respectively, provided written consent to participate in some aspect of the study. Data were collected from 331 (188 younger and 143 older children). Those included in the 2006 cross-sectional analyses watched less TV (166.7 vs 196.3 mins/day, p<0.001), a lower proportion watched TV for ≥2 hours/day (69.0% vs 79.4%, p<0.001) and a higher proportion had high maternal education (45.2% vs 32.5%) compared to the remainder of the 2002/3 sample.

In 2006, parents proxy-reported for children and adolescents self-reported hours spent watching non-commercial TV (includes Pay TV and videos or DVD’s and free-to-air channels) and commercial TV on a usual weekday and a usual weekend day separately. These items were repeated in 2008. Response scales ranged from zero to six or more hours, with half-hour increments. Responses for commercial and non-commercial viewing were summed and averaged across school days and weekends. The test-retest reliability (ICC=0.78) of this measure was acceptable among parents and there was congruence between parental and adolescent reports for usual daily duration of TV viewing (rho=0.70, p<0.001) at the first follow-up.

Parents reported their agreement with two statements about perceived availability of neighborhood recreation facilities (‘Our neighborhood has good sporting facilities for my child to use’; ‘Our
neighborhood has many good places where my child can be physically active’) and two statements about perceived neighborhood safety (‘Our neighborhood is safe at any time for my child to walk or ride his/her bike in the streets’; ‘There is so much traffic in our neighborhood that it is difficult or unpleasant for my child to go for a walk’). Response options (and coding) were: disagree (1); slightly disagree (2); neutral (3); slightly agree (4); agree (5).

Parents reported agreement with eight statements about the perceived social neighborhood environment. Response options (and coding) were: strongly agree (5); agree (4); neither (3); disagree (2); strongly disagree (1); don’t know (3). Responses to the five statements related to social trust/cohesion (‘People around my neighbourhood are willing to help their neighbours’; ‘This is a close-knit neighbourhood’; ‘People in this neighbourhood can be trusted’; ‘People in this neighbourhood generally don’t get along’; ‘People in this neighbourhood do not share the same values’) were averaged to create a score (alpha=0.86, 2 items reverse-scored). Responses to the three statements about social networks (‘I know many people in this neighborhood’; ‘My child has many friends in this neighborhood’; ‘There are not many other children around for my child to play or hang around with’) were also averaged to create a score (alpha=0.75). Response options (and coding) for the first two items were identical to those for social trust/cohesion. Response options for the latter item (and coding) were: disagree (1); slightly disagree (2); neutral (3); slightly agree (4); agree (5).

Postcode-level data on reported incidents of crime (incidents reported to Police for which a crime report was completed) between July 2005 and June 2006 were sourced from Victoria Police, and include 27 broad offence categories. Incidents of crime were weighted by population using data from the 2006 Australian Bureau of Statistics Census of Population and Housing (Census Tables, http://abs.gov.au/websitedbs/D3310114.nsf/home/Census+data, accessed 23 July, 2010) and are expressed as incidents per 1000 population.

Objective measures of the physical neighborhood environment were generated using a Geographic Information System (GIS; ESRI ArcView, ESRI ArcGIS (v9.3) and extensions, Redlands CA). Spatial datasets used to build the GIS were owned and supplied by the State of Victoria (VicMap Property, VicMap Address, VicMap Transport) and the Australian Research Centre for Urban Ecology (Open Space 2002 dataset). Participant residential addresses were geocoded, as were the
locations of playgrounds and sports options sourced from community directories, local government, electronic telephone directories and other websites. Destinations, connectivity and traffic exposure within 800m of each participant’s home were examined using the road network. A buffer of 800m has been shown to result in a greater number of associations between the neighborhood physical activity environment and adiposity among children than a larger-scale buffer of 2km.\textsuperscript{23}

Destinations: The area of public open space (POS, excluding cemeteries, golf courses, educational facilities and scouting spaces) and POS classified as ‘sport/recreation’ (km\textsuperscript{2}), number of playgrounds and opportunities to engage in the nine most popular sports/physical activities and the total length (m) of walking or cycling paths were computed. Popular sports include frequently played organized sports with participation rates greater than 5% (swimming, soccer, netball, tennis, basketball, Australian Rules football, cricket) among 5-14 year-olds in 2006, as well as bike riding (73% participation in 2006, BMX locations examined) and skateboarding/rollerblading (29.2% participation, skateboarding facilities examined).\textsuperscript{24} Walking or cycling paths were identified using VicMap Transport 2006 and their total length was examined separately.

Road connectivity: The total number of cul-de-sacs (dead-end roads) and intersections, and the proportion of intersections that were at least 4-way were calculated. Each child’s effective walkable area was also computed by dividing the total area within each child’s 800m road network buffer (walkable catchment) by the total area included in an 800m Euclidian buffer; a higher effective walkable area value indicates greater connectivity.

Traffic exposure: The total lengths of ‘busy’ roads and of roads classified as ‘local’ were calculated as indicators of traffic exposure\textsuperscript{23} and expressed as a proportion of the length of all roads within 800m. Busy roads included those classified as freeways, highways or arterial roads.

Analyses were performed using Stata 8.0 (Stata Corp, College Station TX, 2003). To maximize the sample size, cross-sectional analyses were based on participants without missing data for the neighborhood variables and TV viewing in 2006 (n=359). Longitudinal analyses were based on those in the cross-sectional analyses that maintained the same address and did not have missing data on TV viewing in 2008 (n=262). Analyses were split by age group.
Linear regression analyses predicted duration of TV viewing at baseline, and also at follow-up controlling for baseline values. Due to skewness, transformed (square root) television viewing was used to determine statistical significance; however, for interpretability regression coefficients and confidence intervals presented in Tables 3 and 4 are based on non-transformed data. Separate linear regression analyses were initially performed for each independent variable, adjusting for sex (partially-adjusted models). Multivariable linear regression models were then constructed, including all variables significantly associated with (transformed) TV viewing in partially-adjusted models (p<0.05), and adjusting for sex and maternal education (confounder). There was no evidence of collinearity between independent variables (r<0.7 and VIF<2) for Model 2.25 All models accounted for unit of recruitment (school) using robust standard errors generated by the ‘cluster’ command.

Results

The cross-sectional sample comprised 190 children (51% boys, mean age 9.1±0.5 years) and 169 adolescents (48% boys, 14.1±0.6 years). Eighty-seven percent of participants had carers who were married or living together. Most female carers had a high level of education (18% low, 36% medium, 45% high) and were in paid employment (22% full-time, 45% in part-time). The longitudinal sample comprised 157 children (51% boys, 9.1±0.5 years) and 105 adolescents (48% boys, 14.1±0.5 years). Mean duration of television viewing was 169.4±88.2 mins/day among children in 2006 and 190.7±102.4 mins/day among adolescents. In 2008, mean durations were 182.5±92.7 mins/day among children and 184.5±122.1 mins/day among adolescents. There was a significant increase among children between 2006 and 2008 (p<0.01). Geometric means were 146.0 and 159.6 mins/day among children in 2006 and 2008, respectively, and 162.8 and 151.5 mins/day among adolescents. In 2006, 68.4% of children and 71.6% of adolescents watched ≥2 hrs/day of television. In 2008, these proportions were 71.3% and 65.7%, respectively. There were no differences according to sex in either age group.

Table 1 shows the distribution of objective and perceived neighborhood variables for each age group. Compared to children, adolescents had more POS and sport/rec POS, playgrounds, sport options and
busy roads within 800m of home, and their parent’s level of agreement with about availability of
sporting facilities and other places for physical activity, general safety and social trust and cohesion
were higher. Reported incidents of crime in the residential postcode and parental agreement that there
is so much traffic it is difficult for their child to go for a walk were higher among children than
adolescents.

Significant (p<0.001) cross-sectional and longitudinal associations with duration of TV viewing time
are shown in Tables 2 and 3. For children (Table 2), higher numbers of cul-de-sacs in the
neighborhood and crime incidents were associated with more TV viewing, and parental perceptions
that the neighborhood has good sporting facilities for their child were associated with less TV viewing
cross-sectionally. A negative association with parental perception that the neighborhood has good
places to be active approached significance (p=0.07). There were no significant associations between
neighborhood features and TV viewing two years later.

Among adolescents (Table 3), associations between number of cul-de-sacs (p=0.1) and reported
incidents of crime (p=0.09) approached significance in the final cross-sectional model.

Longitudinally, each additional sports option and unit increase in parental agreement that there is so
much traffic in the neighborhood it is difficult or unpleasant for their child to walk were associated
with less TV viewing two years later, while associations for social trust and cohesion and for social
networks approached significance (p=0.09 for both).

Discussion

This study is one of the first studies to cross-sectionally and prospectively examine both social and
physical neighborhood correlates of TV viewing in children and adolescents. Several aspects of
neighborhood environments were associated with TV viewing. While some of the results seem
counterintuitive, they indicate that high reported crime may encourage youth to watch TV rather than
engage in other pursuits, and that ensuring access to places for structured physical activity may be
important to provide children and adolescents with alternatives to TV viewing.

Reported incidents of crime were positively associated with TV viewing cross-sectionally among
children and the positive association among adolescents approached significance (p=0.085). This is
consistent with the findings of Brown et al.,\textsuperscript{17} though they found associations only for certain types of
crime and only for girls (no interaction by sex was found in the present study, data not shown). It is
also consistent with studies reporting inverse associations between objective measures of crime and
physical activity in adolescents.\textsuperscript{26} Although safety is often posited as a key influence on children’s
physical activity behavior, there are many aspects of safety\textsuperscript{15} and it is notable that neither measure of
perceived safety was associated with TV viewing in children (these items tapped into other
dimensions of safety specific to walking and cycling in the streets). Further, although it was
hypothesized that youth may feel safer and have more social opportunities, and their parents may feel
more comfortable for their child to be outdoors in cohesive neighbourhoods where they know and
trust people, consistent with the findings of Veitch et al.\textsuperscript{18} neither social trust/cohesion nor social
networks were associated with TV viewing in this study. Perceived safety risk due to crime rates may
be a potent deterrent to spending time outdoors, thus leading to increased TV viewing. The concept
of constrained behavior due to perceived risk requires further exploration.\textsuperscript{27}

Conversely, living in areas with good sports facilities and a variety of sport options was associated
with less TV viewing cross-sectionally among children and longitudinally among adolescents,
respectively, consistent with the findings of Roemmich et al.\textsuperscript{19} It is plausible that access to facilities
is associated with less TV viewing given that it is a consistent correlate of physical activity among
youth.\textsuperscript{14} The findings suggest that it is likely that children will watch less TV when there are other
appealing things to do in their neighborhood. It is notable that the destination variables that were
associated with TV viewing related to sport, rather than to general places where physical activity can
occur, such as parks, playgrounds or other spaces for physical activity. Opportunities for organized
sport in particular may be a more enduring alternative to TV viewing because organized sport is
structured, requires commitment from the participant and may be social in nature. The provision of
appropriate age-specific sporting facilities within neighborhoods is important and may provide an
alternative to TV viewing.

Density of cul-de-sacs was positively associated with TV viewing among children and the association
approached significance among adolescents in Model 2 (p=0.1). Areas with many cul-de-sacs may be
less walkable, with indirect and longer routes to other activities or places of interest (such as shops
and sports facilities) or more likely to be primarily residential. Counter to expectations, parental perception that there is so much traffic it is difficult for their child to go for a walk was associated with less TV viewing two years later among adolescents. A potential explanation is the impact of connectivity on traffic; it has been suggested, for example, that increasing the connectedness of streets may increase traffic on local roads. Just as well-connected streets provide pedestrians with relatively more direct route choices, it may do the same for vehicles, creating the potential to use local roads as short-cuts. This would increase traffic and explain the negative finding between parental perceptions of traffic and TV viewing. Such use of local roads is less likely in areas heavily populated with cul-de-sacs. However, there were no associations with other indicators of connectivity examined in this study (intersection density, proportion of intersections with four or more legs or walkable service area) and previous studies examining indicators of connectivity and television viewing and physical activity also report mixed findings. This highlights the complexity of the impact of urban design and connectivity on behavior.

While this study found associations between the neighborhood environment and TV viewing among both children and adolescents, only one of the parent-reported perceptions of the neighborhood was significant among adolescents. This may reflect a higher level of independent mobility among adolescents compared to children where parents are gatekeepers of their child’s behavior, and/or discordance between views of the neighborhood between adolescents and their parents. Different results may have been found if self- rather than parent-reported perceptions of the neighborhood were used. The study is also limited by the small sample size, particularly for longitudinal analyses and a study of environmental correlates which typically find small effect sizes. The objective measure of crime is a strength, however incidents reported to the Police may not be classed as crime once investigated and it is possible that some incidents are not reported.

Conclusions

Television viewing is a pervasive behavior associated with several negative health and behavioural outcomes. High crime and a lack of quality sporting facilities may contribute to greater time spent watching TV among children and adolescents. Intervention efforts may therefore benefit from
highlighting the existence of and/or lobbying for sport facilities and structured recreation options in or close to residential areas to provide attractive alternatives to TV viewing among youth in a setting free from crime. In addition to TV viewing, further research should consider a broader range of sedentary behaviors and access from home to specific places of interest.

Practical implications

- There is a need for action to reduce the high incidence of TV viewing among children
- Reducing crime may be important to lower TV viewing among youth
- Ensuring access to places for structured physical activity may be important for lowering TV viewing among youth; this may be achieved through highlighting the existence of and/or lobbying for sport facilities and structured recreation options close to residential areas.

Acknowledgement

This study was funded by the Australian Research Council (DP0664206). The authors wish to thank RR for her work generating the GIS variables. AT and DC are recipients of Public Health Research Fellowships from the Victorian Health Promotion Foundation. KB is supported by a NHMRC Senior Research Fellowship (ID: 479513). JS is supported by a National Heart Foundation of Australia and sanofi-aventis Career Development Fellowship. The contributions of StV and JB are supported by a grant from the World Cancer Research Fund International (2007/47).
References


Table 1 Distribution of objective neighborhood variables and parental perceptions of the physical and social neighborhood environment among children (n=190) and adolescents (n=169)

<table>
<thead>
<tr>
<th>Objective physical neighborhood</th>
<th>Children (mean, sd)</th>
<th>Adolescents (mean, sd)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Destinations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of public open space (km²)</td>
<td>0.06 (0.08)</td>
<td>0.09 (0.09)**</td>
</tr>
<tr>
<td>Area of sport and recreation public open space (km²)</td>
<td>0.03 (0.06)</td>
<td>0.04 (0.08)*</td>
</tr>
<tr>
<td>Number of playgrounds</td>
<td>1.6 (1.3)</td>
<td>2.0 (1.7)**</td>
</tr>
<tr>
<td>Number sport options</td>
<td>1.0 (1.9)</td>
<td>1.4 (1.9)*</td>
</tr>
<tr>
<td>Linear length of walk/cycle tracks (m)</td>
<td>323.2 (656.3)</td>
<td>461.5 (56.3)</td>
</tr>
<tr>
<td><strong>Road connectivity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of cul-de-sacs</td>
<td>14.6 (12.5)</td>
<td>13.7 (11.0)</td>
</tr>
<tr>
<td>Total intersections (≥3-way)</td>
<td>45.6 (21.8)</td>
<td>47.6 (19.5)</td>
</tr>
<tr>
<td>Proportion of intersections ≥4-way</td>
<td>0.1 (0.1)</td>
<td>0.1 (0.1)</td>
</tr>
<tr>
<td>Effective walking area</td>
<td>0.4 (0.2)</td>
<td>0.4 (0.1)</td>
</tr>
<tr>
<td><strong>Traffic exposure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of roads classified as ‘busy’</td>
<td>0.08 (0.1)</td>
<td>0.10 (0.1)*</td>
</tr>
<tr>
<td>Proportion of roads classified as ‘local’</td>
<td>0.8 (0.1)</td>
<td>0.8 (0.1)</td>
</tr>
<tr>
<td><strong>Perceived physical neighborhood</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Facilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our neighborhood has good sporting facilities for my child to use</td>
<td>3.8 (1.4)</td>
<td>4.1 (1.3)*</td>
</tr>
<tr>
<td>Our neighborhood has many good places where my child can be physically active</td>
<td>3.8 (1.4)</td>
<td>4.2 (1.2)**</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our neighborhood is safe at any time for my child to walk or ride his/her bike in the streets</td>
<td>2.5 (1.5)</td>
<td>3.6 (1.3)**</td>
</tr>
</tbody>
</table>
There is so much traffic in our neighborhood that it is difficult or unpleasant for my child to go for a walk.

**Incidents of crime/1000 population**

<table>
<thead>
<tr>
<th></th>
<th>Value 1 (SD)</th>
<th>Value 2 (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.4 (1.3)</td>
<td>1.6 (1.1)***</td>
</tr>
</tbody>
</table>

**Social neighborhood**

<table>
<thead>
<tr>
<th></th>
<th>Value 1 (SD)</th>
<th>Value 2 (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social trust and cohesion score</td>
<td>3.4 (0.8)</td>
<td>3.6 (0.7)*</td>
</tr>
<tr>
<td>Social network score</td>
<td>3.2 (1.1)</td>
<td>3.4 (1.0)</td>
</tr>
</tbody>
</table>

* p<0.05; **p<0.01; ***p<0.001: independent t-tests by age group.

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*a* Higher scores indicate greater level of agreement, score range 1-5

*b* Higher scores indicate greater social trust/cohesion and social networks, score range 1-5
### Table 2. Cross-sectional associations between objective neighborhood environment and parents’ perceptions of the neighborhood environment and duration of TV viewing – children

<table>
<thead>
<tr>
<th>Perceptions of the neighborhood</th>
<th>Partially-adjusted model&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Fully adjusted model&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (95%CI)</td>
<td>B (95%CI)</td>
</tr>
<tr>
<td>(n)</td>
<td>(190)</td>
<td>(185)</td>
</tr>
</tbody>
</table>

**Objective physical neighborhood**

**Road connectivity**

Number of cul-de-sacs  
1.5 (0.6, 2.4)**  
1.3 (0.5, 2.2)**

**Perceived physical neighborhood<sup>d</sup>**

**Facilities**

Our neighborhood has good sporting facilities for my child to use  
-20.1 (-30.4, -9.8)***  
-11.2 (-18.1, -4.3)**

**Safety**

**Incidents of crime/'000 population**  
0.6 (0.3, 0.96)***  
0.4 (0.0, 0.7)*

**Social neighborhood<sup>e</sup>**

Social trust and cohesion score  
-19.5 (-31.8, -7.2)**  
-5.7 (-18.0, 6.5)

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<sup>a</sup> Values of B and 95%CI based on analyses of untransformed dependent variable; significance levels based on transformed variable

<sup>b</sup> Separate models for each independent variable, adjusted for sex: * p<0.05; **p<0.01; ***p≤0.001

<sup>c</sup> Multivariable model adjusting for significant independent variables from partially adjusted analyses, sex and maternal education: **p<0.01; ***p≤0.001

<sup>d</sup> Higher scores indicate greater level of agreement, score range 1-5

<sup>e</sup> Higher scores indicate greater social trust/cohesion and social networks, score range 1-5
**Table 3.** Cross-sectional and longitudinal associations between objective neighborhood environment and parents’ perceptions of the neighborhood environment and duration of TV viewing – adolescents

| Perceptions of the neighborhood | Cross-sectional<sup>a</sup> | Longitudinal | 
| --- | --- | --- | --- |
|  | Partially-adjusted | Fully adjusted | Partially-adjusted |
|  | model<sup>b</sup> | model<sup>c</sup> | model<sup>d</sup> |
| (n) | (169) | (164) | (105) |

**Objective physical neighborhood**

**Destinations**

Number of sport options  
-0.5 (-9.2, 8.2) -- -12.4 (-19.8, -5.0)**

**Road connectivity**

Number of cul-de-sacs  
1.3 (-0.1, 2.7) * 0.9 (-0.4, 2.2) -0.3 (-1.5, 0.9)

**Traffic exposure**

Proportion of roads classified as ‘busy’  
165.3 (-215.8, 346.5) -- -184.6 (-365.2, -4.1)* -

Proportion of roads classified as ‘local’  
-98.7 (-265.7, 68.3) -- 163.2 (60.8, 265.7)*

**Perceived physical neighborhood<sup>d</sup>**

**Facilities**

Our neighborhood has many good places where my child can be physically active  
-4.5 (-19.1, 10.0) -- 12.1 (1.7, 22.5)*

**Safety**

Our neighborhood is safe at any time for my child to walk or ride his/her bike in the streets  
2.0 (-8.6, 12.7) -- 16.0 (4.2, 27.9)***

There is so much traffic in our neighborhood that it is difficult or unpleasant for my child to go for a walk  
6.3 (-7.4, 20.1) -- -24.1 (-37.3, -10.8)*

**Incidents of crime/’000 population**

0.5 (0.1, 0.9)** 0.4 (-0.1, 0.9) 0.2 (-0.2, 0.6)

**Social neighborhood<sup>e</sup>**
<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>95% CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social trust and cohesion score</td>
<td>-2.7</td>
<td>(-22.9, 17.5)</td>
<td></td>
</tr>
<tr>
<td>Social network</td>
<td>-0.1</td>
<td>(-8.3, 8.1)</td>
<td></td>
</tr>
</tbody>
</table>

*Values of B and 95%CI based on analyses of untransformed dependent variable; significance levels based on transformed variable

Separate models for each independent variable, adjusted for sex: * p<0.05; **p<0.01; ***p<0.001

Multivariable model adjusting for significant independent variables from partially adjusted analyses, sex and maternal education: * p<0.05; **p<0.01; ***p<0.001

Higher scores indicate greater level of agreement, score range 1-5

Higher scores indicate greater social trust/cohesion and social networks, score range 1-5