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**What influences parents' fear about children's independent mobility? Evidence from a statewide survey of Australian parents.**

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**What influences parents' fear about children's independent mobility? Evidence from a state-wide survey  
of Australian parents**

**ABSTRACT**

**Purpose:** To identify factors associated with generalized and stranger-specific parental fear about children's independent mobility (CIM); a critical aspect of physical activity.

**Design:** Cross-sectional survey; random sampling frame, minimum quotas of fathers, rural residents.

**Setting:** State of Victoria, Australia.

**Subjects:** Parents of children aged 9 to 15 years ( $n=1779$ ), 71% response rate.

**Measures:** Validated measures of Parental Fear (PF) and Fear of Strangers (FoS); parent, child, social & environmental factors.

**Analysis:** Unadjusted and adjusted linear regression stratified by child age (9-10; 11-13; 14-15).

**Results:** Adjusted models explained a substantial proportion of variance across all age groups (PF: 33.6%-36.7%; FoS: 39.1%-44.0%). Perceived disapproval from others was consistently associated with both outcomes (PF: Beta = .11 to .23,  $p \leq .05$ ; FoS: Beta = .17 to .21,  $p \leq .001$ ) as was parents' perception of children's competence to travel safely (PF: Beta = -.24 to -.11,  $p \leq .05$ ; FoS: Beta = -.16 to -.13,  $p \leq .01$ ). Factors associated with FoS included having a female child (Beta = -.21 to -.13,  $p \leq .001$ ), language other than English (Beta = .09 to .11,  $p \leq .01$ ) and low levels of parent education (Beta = -.14 to -.08,  $p \leq .05$ ).

**Conclusion:** The current study suggests that social norms, child competence, and perceptions about the benefits of CIM underpin parental fear. This evidence informs the development of interventions to reduce parental fear and promote children's CIM and physical activity.

**Key words:** children's independent mobility; children's physical activity; parenting; parental fear; children's safety

**Indexing Key words:** research; relationship testing; non-experimental; cognitive; state; physical activity; behavior change; adults; geographic location

## PURPOSE

Children in developed countries are becoming increasingly sedentary<sup>1</sup>. This is being heralded as a looming public health crisis. In Australia, 25% of children are overweight or obese<sup>2</sup>, raising concerns about long term health impacts. Children's independent mobility (CIM), or the ability to move around the neighborhood without adult accompaniment<sup>3</sup> is a well-established developmental milestone. In addition to physical activity<sup>4-6</sup>, CIM is a means of fostering independence, motor, cognitive and social skills<sup>7-9</sup>. Parents are by and large the 'gatekeepers' to children's independence and autonomy across all stages of childhood<sup>10</sup>; yet, a growing body of evidence suggests that parents' fears pose a significant barrier to CIM<sup>7,11-13</sup>. Parents' decision-making about appropriate levels of CIM is likely to reflect sources of fear which are commonly recognized as barriers to CIM, including fear of harm from strangers, or fear of injury from traffic hazards. Examining the nature of parental fear is important given that it may prevent parents from supporting children's age-appropriate independent mobility, leading to reduced opportunities for physical activity and increased health risks. This paper presents findings from an Australian population study that explored factors impacting on parental fear in the context of CIM.

Parents' fear may pertain to a range of risks, real or perceived, including harm or abduction by a stranger, traffic risks, bullying, dog attacks, or getting lost<sup>14-16</sup>. In an Australian qualitative study<sup>12</sup>, parents of children aged 6-12 years reported being concerned about injury from traffic, poor infrastructure to support CIM, and their child's ability to negotiate the environment independently; however, many acknowledged that for children to be independently mobile, they would have some "scrapes and bumps along the way". Parents described a "powerful fear" of abduction or sexual assault by a stranger, generating a constant struggle between the benefits of promoting independence and the ever-present concern, "what if?" In contrast, Villanueva et al<sup>17</sup> administered parent surveys and found no association between CIM and parental fear (i.e. stranger danger, bullying and personal injury). Foster and colleagues<sup>18</sup> asked parents of 10-12 year old children to rate how fearful they were that their child might be approached, taken, or hurt by a stranger while independently mobile. Greater parental fear of strangers was associated with lower odds of CIM, particularly for girls, who were 30% less likely to be independently mobile than boys ( $OR=.71, p<.01$ ); a finding supported in other studies<sup>11</sup>.

Parents' own experiences can influence the freedoms they offer their child, shaping their perceptions of CIM in what is a complex and constant process of negotiation<sup>12</sup>. Parents may express greater fear if they believe that their child's skills and maturity are insufficient to permit safe unaccompanied travel<sup>17</sup>. Further, strong and cohesive community networks (i.e. social capital) where parental monitoring is shared amongst the broader local

neighborhood, is associated with greater willingness to grant independence. This likely reflects an expectation that neighbors will intervene on children's behalf, and is associated with greater CIM<sup>19</sup>. Parents tend to encourage their child's independent mobility if they perceive their local community as safe, with well-connected streets, traffic lights, crossings, low traffic, and when they live in close proximity to school<sup>15,17,20</sup>. Despite this, there is evidence that built environment factors may have little effect on the association between parental fear and CIM<sup>18</sup>. This emerging body of research demonstrates the relevance of PF as a factor in CIM; however, the factors associated with PF are not widely understood.

One of the issues preventing detailed exploration of parental fear to date is the lack of robust, validated measurement tools. While parental fear is frequently cited as a barrier to CIM, it is typically measured using a single-item indicator, rather than as a validated multi-item measure. The only available validated measure is the 'Fears of Stranger Danger Scale'<sup>11</sup>, which captures parents' stranger-specific fear in the context of CIM, rather than fear more broadly which may affect parents' decision-making.

The somewhat inconsistent research evidence suggests that parents' fears about children's safety are potentially influenced by interacting parent, child, social and neighborhood factors; yet, the relative contribution of these multiple influences is largely unknown as they are rarely studied together. This poses a significant barrier for effective interventions that encourage CIM.

In light of these existing limitations, we present here a state-wide study of parental fear in a random sample of 2,002 parents of school-aged children aged 9-15 years. We use robust, recently validated measures to estimate the relative associations of important social, environmental and behavioral determinants. We adopt a socio-ecological approach<sup>21</sup> to understanding the factors underpinning parental fear. Based on a rigorous review of the literature, together with qualitative data collected from parent and child focus groups<sup>22</sup>, we propose that multi-tiered social structures surrounding a parent and child influence behaviors and decision-making, including: (i) parent, child, and family characteristics (e.g. age, gender, child disability, Indigenous status, household characteristics, number of motor vehicles, parent education and employment); (ii) parental attitudes (e.g. perceived benefits of CIM, rating of child competence, past experience of strangers, parent mental health (iii) social (social capital, perceived disapproval from others), and (iv) neighborhood factors (e.g., livability, socio-economic position of local area, distance to school, neighborhood safety, roads, footpaths, traffic, parks). While previous studies have included these predominantly in isolation, we consider the relative contribution of these factors together for the first time. We extend previous research which has predominately focused on the

built environment, to include a broad range of factors which may be equally important in explaining parental fear.

The present study aims to investigate: (i) the family, parent, social and neighborhood factors associated with parental fear in the context of CIM, and (ii) the family, parent, social and neighborhood factors associated with stranger-specific fear in the context of CIM. Given that levels of CIM vary as children grow and develop skills for greater independence<sup>23</sup>, we consider findings in terms of three child age groups; primary school (9-10 years), transitional years between primary and secondary school (11-13 years), and secondary school (14-15 years). Stranger-specific fear dominates the discourse in this area<sup>11,18,24</sup>; therefore, we differentiate between ‘generalized’ fear and ‘stranger-specific’ fear to investigate factors commonly (or uniquely) associated with each.

## **METHODS**

### **Design and Sample**

A cross-sectional state-wide survey was conducted with parents living in Victoria, Australia. Parents completed a 20-minute survey via Computer-Assisted Telephone Interview. Ethical approval was obtained from the Parenting Research Centre Human Research Ethics Committee (Application No. 19 & 20 2013). A random digit dialing strategy was used to identify and screen participants. Quotas were applied to ensure adequate sampling of mothers and fathers, families living in metropolitan and non-metropolitan regions, and children aged between 9 and 15 (i.e. 30% fathers, 30% non-metropolitan residents, and equal distribution across all child ages). Inspection of landline and mobile phone participants’ responses early during data collection revealed no significant differences in sample characteristics; therefore, subsequent calls were made only to landlines to minimize research costs. Eligible participants were parents or guardians  $\geq 18$  years, residing in Victoria, with at least one child aged 9-15 years, and with sufficient English to comprehend and respond to survey questions. For families with more than one eligible child, a single focus child was randomly selected by a computer-generated process. All participants provided verbal consent via phone.

Of the 2,820 eligible parents, 2,002 completed the survey (response rate of 71%). Of these, N=223 were excluded from analysis due to missing data; this sub-group was compared to the final included sample of N=1779 (see Table 1). The majority of participants were female and located in metropolitan areas, nearly half had completed higher education (i.e. college-level qualification), and over three-quarters were from couple families. Around one-fifth reported speaking a language other than English, around one-quarter were born

outside of Australia and New Zealand, and more than half resided in dual-income households. Socio-economic disadvantage was described using the Socio-Economic Index of Relative Disadvantage, based on participants' postcode of residence<sup>25</sup>. Scores indicated that participants were living in slightly less disadvantaged areas compared to the Australian mean of 1000. Participants in the excluded sample were more likely to be unemployed or not in the labor force, speak a language other than English, and live in a non-metropolitan, more disadvantaged location, and in a single-income household.

## Measures

Generalized parental fear (PF) about CIM was measured using four items on a five-point scale, where 1=not at all like me and 5=extremely like me (e.g. "I am fearful of letting my child go out anywhere without an adult"). Fear of Strangers (FoS) was measured using five items on a five-point scale, where 1=strongly disagree and 5=strongly agree (e.g. "I am anxious my child will be approached by a stranger if they go out alone"). Total possible scores ranged from 4-20 for PF and 5-25 for FoS, with higher scores indicating greater fear. Both measures demonstrated high internal consistency (Coefficient H = 0.91 and 0.93, respectively), were discriminant from psychological distress (Kessler-6<sup>26</sup>), and were associated with the range of activities children were permitted to do without an adult (e.g. walking or cycling in the street or going to the park)<sup>27</sup>. Variables tested for association with PF and FoS are presented in Table 2, corresponding to four domains: (i) family characteristics; (ii) parental experiences; (iii) social; and (iv) neighborhood factors.

## Analysis

Data were analyzed using Stata SE Version 13<sup>28</sup>. Correlations were examined between the primary outcome variables, PF and FoS, and all other variables for evidence of multicollinearity. Unadjusted and adjusted linear regression was then used to test the association between the outcomes and all parent, child, social and neighborhood factors, stratified by child age (9-10 year olds; 11-13 year olds; 14-15 year olds). A stranger-specific variable ("past experience of strangers") was only included in the FoS model. Adjusted analyses included only factors associated at the unadjusted-level ( $p \leq .05$ ). Models were adjusted for parent age, parent gender, child gender, child disability status, language other than English (LOTE), number of children  $\leq 18$  years living at home, parent employment status, parent education, and couple or single-parent household status.

## RESULTS

### **Descriptive statistics**

From the full sample ( $N=2,002$ ), 1,779 participants (88.9%) provided complete data for PF and 1,742 (87.0%) for FoS. Mean scores on PF were highest for 9-10 year olds,  $M (SD) = 10.4 (3.9)$ , with lower scores for 11-13 year olds  $M (SD) = 9.1 (3.8)$  and 14-15 year olds  $M (SD) = 7.8 (3.3)$ . A similar pattern was evident for FoS scores from youngest to oldest child age,  $M (SD) = 15.8 (5.1)$ , 14.25 (5.15), and 12.33 (4.75), respectively. Unadjusted associations are presented in a Supplementary Table.

### **Factors associated with generalized Parental Fear**

Table 3 presents the adjusted associations between PF and a range of factors, stratified by child age group. The adjusted models explained between 34% - 37% of the variance in PF. Psychological distress was consistently associated with greater PF across all age groups. Lower perceived child competence and higher perceived disapproval from others was also associated with higher PF. Metropolitan location was associated with greater PF; however, this was most pronounced for the youngest age group. Perceived neighborhood risk was related to greater PF, particularly for the oldest age group. Socio-economic disadvantage was only associated with PF in the youngest age group; for these children, parents living in more disadvantaged areas were likely to express greater fear. High traffic was associated with greater fear only for the youngest age group.

### **Factors associated with specific Fear of Strangers**

Table 4 presents the adjusted associations between FoS and a range of factors, stratified by child age group. The adjusted models explained between 42% - 44% of the variance in FoS. Standardized beta coefficients revealed that parents of girls reported greater FoS than parents of boys. Parents who spoke a LOTE or parents without higher education were more likely to report greater FoS. Single parents of a younger child were at greater risk of feeling fearful about strangers; an association which was not evident for parents of older children. Parents reported greater FoS if their child did not carry a mobile phone; however, this was evident only for parents of 11-13 year olds. Psychological distress was associated with increased fear of strangers, most notably for parents of older children. Parents' attitudes and experiences were highly associated with FoS across all three age groups. Parents' encouragement of autonomy was particularly important for younger children; parents who encouraged their children's independence were less likely to fear strangers. Conversely, parents who perceived few benefits of independence, questioned their child's competence, or worried about disapproval from others were more likely to be fearful. Greater perceived risk was also associated with increased FoS across

all age groups. Few neighborhood factors were associated with FoS at the adjusted-level; greater fear was associated with living in an unsafe neighborhood or a metropolitan location across all age groups, and with greater neighborhood disadvantage for the oldest age group only.

## **DISCUSSION**

This is one of the first studies to specifically investigate factors associated with parental fear in the context of CIM using validated measures. Previous research has focused on the built environment or treated parental fear as a unidimensional construct; however, our research distinguishes between generalized parental fear and stranger-specific fear, to provide new knowledge about which factors contribute to parents' fear about CIM. Some important drivers were common to both types of fear, such as parents' perceived disapproval from others and parents' perception of children's competence to travel safely without an adult. Parents of girls, parents with low levels of education and parents who spoke a language other than English consistently reported heightened stranger-specific fear, which persisted across all three age groups.

### **Family characteristics**

Findings suggest that non-modifiable family characteristics are important determinants of parental fear. Families with a LOTE background may be particularly vulnerable to greater parental fear due to fewer social supports, or different cultural norms about what is 'appropriate' independence for children. Our finding that parents of girls were likely to report greater fear, particularly fear of strangers, is consistent with previous research<sup>11,18</sup> and draws to attention the wider, gendered, social dimension to parental fear linked to the persisting sexual vulnerability and violence against females<sup>29</sup>. As expected, parental fear was lowest for older children, as they are more likely to have developed the necessary skills for safe independent mobility<sup>23</sup>. While not typically amenable to change, understanding demographic factors associated with greater fear would allow future health promoting policy and programmatic interventions to be targeted to potentially vulnerable parents who may benefit the most.

### **Parent experiences**

For both general and stranger-specific fear, parents were less fearful if they understood the benefits of independent mobility, believed their child had the skills to travel safely, and encouraged their child's autonomy. Children's possession of a mobile phone was not associated with generalized fear, but was associated with less

fear of strangers for parents of children aged 11-13 years. While mobile phone provision has been shown to alleviate parents' fear and support CIM<sup>30</sup>, it may be a particularly important strategy for children transitioning from primary to secondary school. Parents who reported psychological distress were also more likely to report greater fear, perhaps reflecting inadequate social support, a lack of self-efficacy to negotiate independent activities with their child, or a greater level of general distress which may contribute to heightened fear pertaining to CIM. Parents without higher education were also more likely to experience fear, which may reflect contextual factors such as being in a lower paid position and therefore being more likely to be living in a less safe environment.

### **Social factors**

Of particular concern to parents was the disapproval of family, friends, or school teachers about their decisions related to independent mobility. Perceived disapproval was one of the strongest factors across all age groups for both PF and FoS, even after controlling for all other variables. This is consistent with findings from Veitch et al<sup>31</sup> about the power of social norms in shaping parents' decision-making around CIM, but contrasts with other studies which have concluded that parents did not view disapproval from others as a significant issue<sup>32,33</sup>. This may be in part due the differences in the measures used; Carver et al<sup>33</sup> simply asked parents to nominate "the main reason for accompanying their child to non-school local destinations". Parents could only select one response, preventing identification of relative contributions of each factor. Additionally, in this study we have examined the associations with parental fear, rather than CIM directly. It is possible that, when asked directly, parents more readily acknowledge salient factors such as traffic or strangers, rather than social sanctions surrounding CIM. Indeed, we are often reluctant to admit being influenced by other people's behavior or opinions. The relationship between PF and perceived disapproval was strongest for 11-13 year old children, during which time children in Victoria are transitioning from the more controlled confines of primary school to attend a secondary school which is often located further afield<sup>34</sup>. At times of transition parents may look to others for cues about when to grant further independence and how much independence is appropriate. Despite previous contradictory evidence, it seems feasible that disapproval from others would impact parents' decision-making processes, whereby social norms are shaped by perceptions of what other parents regard as "appropriate" independence, and parents who afford their children greater freedom may be viewed as irresponsible<sup>35</sup>. Low social capital was also associated with higher fear of strangers for 11-13 year olds, but not the other age groups. Together, these findings suggest that social cohesion, community norms and social support

play a key role in the level of parents' fear, affecting their capacity to foster independent mobility at a key life stage for children.

### **Neighborhood factors**

While built environment factors were strongly associated with parents' fear in the unadjusted analyses (e.g. crossings, footpaths, parks, traffic, busy roads), these associations dramatically attenuated in the adjusted models. Only location, neighborhood safety and perceived risk remained salient factors. Residing in a metropolitan location was related to increased general and stranger-specific fear across all age groups, as was living in a neighborhood deemed to be generally "unsafe" or one in which a child would come to direct harm (e.g. lost, injured, bullied). This is consistent with previous evidence that families in rural or regional locations may benefit from greater social cohesion, neighborhood knowledge, and less perceived risk to personal safety compared to urban dwelling families<sup>36</sup>. Parents living in less 'safe' neighborhoods may indeed be exercising appropriate care and caution in restricting CIM.

### **Implications**

Findings highlight a number of feasible opportunities to support parents to facilitate their child's age- and developmentally-appropriate independent mobility. Australian interventions to date have largely focused on the built environment and in particular, the journey to school (e.g. targeting safe routes, bike / walking paths; road safety etc.). For example, "Walking School Bus" or "Ride2School" programs have had varying levels of success, and sustained impact has been difficult to achieve, requiring significant resources and staff/parent time to implement<sup>37,38</sup>. The current study suggests that addressing parental, social and community-level factors are just as vital. Interventions which focus on educating, engaging and supporting parents, rather than changing their environment, might ameliorate parents' fear and ultimately generate effective transitions towards increased independence and physical activity. Such interventions could support parents to recognize the wide-ranging benefits of independent mobility for children, and to foster the skills necessary for independent mobility (e.g. practice walking and cycling together, talking about what to do if something 'bad' happens), as well as enhancing their own confidence and competence (i.e. reducing fear). Further, the consistent elevated concerns for parents of girls points to another linkage between gender inequality and gendered violence directed towards women and girls as a powerful, socio-structural backdrop for CIM. Efforts to address and prevent these at the societal level and address the social determinants of CIM may thus yield an unexpected, additional benefit for

children's physical activity and independence. Future research is required to identify ways in which we might shift social norms about CIM; parents need to feel empowered, not judged. Designing and evaluating effective interventions that target *beyond* 'safe routes' to support and inform parents to make age- and developmentally-appropriate decisions for their children is recommended.

### **Limitations and strengths**

As is common with research of this kind, participants were from slightly more advantaged socio-economic backgrounds than the general Victorian population and findings need to be confirmed for diverse communities across the population. The cross-sectional research design does not allow for causal interpretation. Some of the relationships we identify could be bi-directional. For example, parental fear may reduce social capital and neighborhood livability in that it may prevent the formation of protective and trusted social relationships. These findings need to be confirmed in longitudinal research. We were not able to establish whether parental fear was in response to a perceived threat (which may or may not be rational), or a true threat. In the latter, such fear would be entirely appropriate. Further, built environment factors represented parents' perceptions rather than objective environmental measures. Nonetheless, a number of research strengths should be acknowledged, including the large state-wide sample, the measurement of both general and stranger-specific parental fear using validated tools, and the inclusion, for the first time together, of a broad range of potential factors associated with parental fear, yielding strong variance in our primary outcomes.

This study provides new evidence about the factors associated with parental fear in the context of CIM. Findings suggest that parental experiences and social factors are strongly associated with parental fear over and above the neighborhood factors typically addressed in health promotion efforts in this field, irrespective of the 'type' of fear under consideration – general or stranger-specific. Parents in the current study readily drew on the thoughts and opinions of those around them - parents, family, teachers, and school principals - in deciding whether to grant independence. Health promoting interventions which aim to reduce parental fear by addressing parents' underlying attitudes and perceptions may provide a useful means of increasing CIM and resultant physical activity. Individual cognitive and behavioral approaches which support parents to strengthen and monitor their child's skill development and to implement age-appropriate strategies may be helpful. However, these need to be in combination with community-wide or school-based interventions and policy-supported campaigns which encourage and normalize children's transition to independent mobility and address gender and social inequality.

## SO WHAT? Implications for Health Promotion Practitioners and Researchers

*What is already known on this topic?* The factors associated with parental fear in the context of children's independent mobility are not well understood. Previous research investigating parental fear has been hampered by a lack of psychometrically sound measurement tools.

*What does this article add?* This study uses validated measures of general and stranger-specific parental fear and a comprehensive range of factors, administered to a large state-wide sample of parents. We found strong evidence that parents' attitudes and experiences, particularly perceived disapproval from others, are strongly associated with parental fear.

*What are the implications for health promotion practice or research?* Findings provide preliminary evidence that that health promotion and public health interventions to foster children's CIM could be enhanced by targeting factors beyond the built environment, such as parents' attitudes, experiences and social norms about children's independence. .

## References

1. Brodersen NH, Steptoe A, Boniface DR, Wardle J. Trends in physical activity and sedentary behaviour in adolescence: ethnic and socioeconomic differences. *British Journal of Sports Medicine*. 2007;41(3):140-144.
2. The Boden Institute of Obesity Nutrition Exercise & Eating Disorders, Menzies Centre for Health Policy. *Obesity: Prevalence Trends in Australia* Canberra: Australian National Preventive Agency;2014.
3. Hillman M, Adams J, Whitelegg J. *One False Move: A Study of Children's Independent Mobility*. London: Policy Studies Institute; 1990.
4. Stone MR, Faulkner GE, Mitra R, Buliung RN. The freedom to explore: examining the influence of independent mobility on weekday, weekend and after-school physical activity behaviour in children living in urban and inner-suburban neighbourhoods of varying socioeconomic status. *International Journal of Behavioral Nutrition and Physical Activity*. 2014;11(1):5.
5. Page A, Cooper A, Griew P, Davis L, Hillsdon M. Independent mobility in relation to weekday and weekend physical activity in children aged 10-11 years: The PEACH Project. *International Journal of Behavioral Nutrition and Physical Activity*. 2009;6(1):9.

6. Oliver M, Parker K, Witten K, et al. Children's out-of-school independently mobile trips, active travel, and physical activity: a cross-sectional examination from the kids in the City study. *Journal of Physical Activity and Health*. 2016;13(3):318-324.
7. Zubrick SR, Wood L, Villanueva K, Wood G, Giles-Corti B, Christian H. *Nothing but fear itself: Parental fear as a determinant impacting on child physical activity and independent mobility*. Melbourne: Victorian Health Promotion Foundation (VicHealth);2010.
8. Malone K. The bubble-wrap generation: children growing up in walled gardens. *Environmental Educational Research*. 2007;13(4):513-527.
9. Risotto A, Giuliani MV. Learning neighbourhood environments. The loss of experience in a modern world. In: Spencer C, Blades M, eds. *Children and their Environments: Learning, Using and Designing Spaces*. Cambridge: Cambridge University Press; 2005:75-90.
10. Davison KK, Lawson C. Do attributes in the physical environment influence children's physical activity? A review of the literature. *International Journal of Behavioral Nutrition and Physical Activity*. 2006;3(1):19.
11. Ding D, Bracy NL, Sallis JF, et al. Is fear of strangers related to physical activity among youth? *American Journal of Health Promotion*. 2012;26(3):189-195.
12. O'Connor J, Brown A. A qualitative study of 'fear' as a regulator of children's independent physical activity in the suburbs. *Health & Place*. 2013;24(0):157-164.
13. Prezza M, Alparone FR, Cristallo C, Luigi S. Parental perception of social risk and of positive potentiality of outdoor autonomy for children: The development of two instruments. *Journal of Environmental Psychology*. 2005;25(4):437-453.
14. Trapp G, Giles-Corti B, Christian HE, et al. Increasing children's physical activity: Individual, social, and environmental factors associated with walking to and from school. *Health Education & Behavior*. 2012.
15. Timperio A, Crawford D, Telford A, Salmon J. Perceptions about the local neighbourhood and walking and cycling among children. *Preventive Medicine*. 2004;38:39-47.
16. Rudner J. Public knowing of risk and children's independent mobility. *Progress in Planning*. 2012;78(1):1-53.

17. Villanueva K, Giles-Corti B, Bulsara M, et al. Does the walkability of neighbourhoods affect children's independent mobility, independent of parental, socio-cultural and individual factors? *Children's Geographies*. 2013;1-19.
18. Foster S, Villanueva K, Wood L, Christian H, Giles-Corti B. The impact of parents' fear of strangers and perceptions of informal social control on children's independent mobility. *Health & Place*. 2014;26:60–68.
19. McDonald N, Deakin E, Aalborg A. Influence of the social environment on children's school travel. *Preventive Medicine*. 2010;50:565-568.
20. Trapp G, Giles-Corti B, Christian H, et al. On your bike! a cross-sectional study of the individual, social and environmental correlates of cycling to school. *International Journal of Behavioral Nutrition and Physical Activity*. 2012;8(1):123.
21. Bronfenbrenner U, Morris P. The bioecological model of human development. In: Damon W, Lerner R, eds. *Handbook of Child Psychology*. 6th ed. New York: John Wiley & Sons; 2006.
22. Author et al. [details removed for peer review]. 2017.
23. Johansson M. Environment and parental factors as determinants of mode for children's leisure travel. *Journal of Environmental Psychology*. 2006;26(2):156-169.
24. Underwood C. Children's independent mobility: fact or fiction: 8 to 12 year olds-worried about strangers. 2012.
25. Australian Bureau of Statistics. Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA). 2011; <http://www.abs.gov.au/websitedbs/censushome.nsf/home/seifa2011>.
26. Kessler RC, Andrews G, Colpe LJ, et al. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*. 2002;32(6):959-976.
27. Author [details removed for peer review]. unpublished
28. *Stata Statistical Software: Release 13* [computer program]. College Station, TX: StataCorp LP; 2013.
29. Michau L, Horn J, Bank A, Dutt M, Zimmerman C. Prevention of violence against women and girls: lessons from practice. *The Lancet*. 2015;385(9978):1672-1684.
30. Brockman R, Jago R, Fox K. Children's active play: self-reported motivators, barriers and facilitators. *BMC Public Health*. 2011;11(1):461.
31. Veitch J, Bagley S, Ball K, Salmon J. Where do children usually play? A qualitative study of parents' perceptions of influences on children's active free-play. *Health & Place*. 2006;12(4):383-393.

32. Rudner J, Malone K. Childhood in the suburbs and the Australian Dream: How has it impacted children's independent mobility? *Global Studies of Childhood*. 2011;1(3):207-225.
33. Carver A, Timperio A, Crawford D. Parental chauffeurs: What drives their transport choice? *Journal of Transport Geography*. 2013;26:72-77.
34. McDonald NC. Children's mode choice for the school trip: the role of distance and school location in walking to school. *Transportation*. 2008;35(1):23-35.
35. Thomson L. *Active Transport Literature Review: How times have changed*. VicHealth;2009.
36. Salmon J, Veitch J, Abbott G, et al. Are associations between the perceived home and neighbourhood environment and children's physical activity and sedentary behaviour moderated by urban/rural location? *Health & Place*. 2013;24:44-53.
37. Author [details removed for peer review]. 2011.
38. Smith L, Norgate SH, Cherrett T, Davies N, Winstanley C, Harding M. Walking school buses as a form of active transportation for children—a review of the evidence. *Journal of School Health*. 2015;85(3):197-210.

Table 1. Sample Characteristics

	Included (N= 1779)	Excluded (N=223 )	p*
<b>Parent</b>			
Parent female, n (%)	1,247 (70.10)	154 (69.06)	.75
Parent age, years, m (sd)	44.77 (6.00)	45.41 (6.46)	.15
Parent education, higher education, n (%)	829 (46.60)	86 (41.75)	.19
Parent employment status, n (%)			.03
Employed	1,411 (79.31)	154 (71.63)	
Unemployed	96 (5.40)	17 (7.91)	
Not in labor force	272 (15.29)	44 (20.47)	
LOTE, n (%)	349 (19.62)	56 (25.23)	.05
<b>Child</b>			
Child female, n (%)	838 (47.11)	106 (47.53)	.90
Child age, years, n (%)			.34
9- 10	501 (28.16)	61 (27.35)	
11-13	793 (44.58)	110 (49.33 )	
14-15	485 (27.26)	52 (23.32)	
Couple family, n (%)	1,526 (85.78)	164 (81.59)	.11
<b>Family</b>			
Non-metro, n (%)	503 (28.27)	77 (34.53)	.05
SEIFA (disadvantage) m (sd)	1021.54 (58.07)	1007.623 (63.92)	<.001
Dual earning family, n (%)			<.01
Two parents employed	1,104 (64.79)	101 (50.50)	
One parent employed	574 (33.69)	95 (47.50)	
Two parents unemployed	8 (0.47)	2 (1.00)	
Neither in labor force	18 (1.06)	2 (1.00)	

\*independent samples t-test for continuous variables, chi-squared test for categorical variables.

Table 2. Factors potentially associated with parental fear and fear of strangers.

Domain	Constructs
<i>Family Characteristics</i>	
Parent age	Age, years (1= 18-24; 2= 25-34; 3= 35-44; 4= 45-54; 5= 55-64; 6= 65-74)
Parent/child gender	0= male; 1= female
Child age	Age, years (1= 9-10; 2= 11-13; 3= 14-15)
Child disability	Parent reported child as having a disability (0= no; 1= yes)
Parent Indigenous status	Identifies as Aboriginal or Torres Strait Islander (0=non-Indigenous; 1=Indigenous)
Parent LOTE	Speaks a language other than English at home (0=no; 1=yes)
Family structure	Couple or single family (0=couple; 1=single parent)
Children in household	Number of children aged <=18 years in household
Household motor vehicles	Number of motor vehicles owned or used by the household
Parent education	Parent attainment of higher education (0=higher education; 1=no higher education)
Parent employment	Parent employment status (1=employed; 2=unemployed; 3=not in labor force)
<i>Parental Experiences</i>	
Encouragement of child autonomy	Possible range 4-20, 4 items on 5-point scale about the extent to which parent encourages child's autonomy (e.g. "I let my child make decisions for himself/herself"). Higher scores indicate greater autonomy.
Positive potentiality	Possible range 6-30, 6 items on 5-point scale about parents' perceived benefits of children's independent mobility (e.g. "A child who goes out alone can make new friends"). Higher scores indicate greater positive potentiality.
Perceived child competence	Possible range 4-20, 4 items on 5-point scale about parents' perceived child competence for independent mobility (e.g. "My child is careless in traffic"). Higher scores indicate greater competence.
Parenting self-efficacy	Possible range 4-20, 4 items on 5-point scale from the Me as a Parent self-efficacy subscale (e.g. "I have confidence in myself as a parent"). Higher scores indicate greater parenting self-efficacy.
Child use of mobile phone	Provision of a mobile phone for child when independently mobile, 0= uses mobile; 1= no mobile or n/a
Past experience of strangers	Parent's experience of unwanted attention or being followed by stranger (0= no; 1= yes)
Parent mental health	Possible range 0-24, 6 items on 5-point scale, K6 (e.g. "How often did you feel worthless?").
Work hours	Number of hours worked during previous week.
Time pressure	Frequency of feeling rushed or pressed for time (1=never to 5=always).
<i>Social</i>	
Social capital	Possible range 4-20, 4 items on a 5-point scale about parents' perceptions of their neighborhood (e.g. "I feel a strong sense of identity with my neighborhood"). Higher scores indicate greater social capital.
Disapproval from others	Possible score 3-15, 3 items addressing parents' perceptions of disapproval from other parents, teachers or principal, and family members about CIM. Higher scores indicated greater perceived disapproval.
<i>Neighborhood</i>	
Socio-economic position	Socio-Economic Index of Disadvantage (SEIFA) determined by postcode.
Location	Location of family residence (0= non-metropolitan; 1= metropolitan)

Perceived likelihood of risk	Possible range 4-20, 4 items on 5-point scale about parents' perceived likelihood of events occurring if child walks or rides a bike in the neighborhood without an adult in the coming year (e.g. "child gets lost").
Livability	Possible range 6-24, 6 items on 4-point scale (e.g. "There is good street lighting"), higher scores indicating greater livability.
Distance to school	Time for child to walk to school (1= < 5mins; 2= 5-10 mins; 3= 11-15 mins; 4= 16-20 mins; 5= 21-40 mins; 6= >40 mins).
Safe crossing to school	Single item on a 5-point scale, "There are no safe crossings for my child to use, such as crossing guards or pedestrian lights".
Cross busy road	Single item on a 5-point scale, "My child would have to cross a busy road".
Traffic	As above. "There is a lot of traffic on the way to school".
Footpath availability	As above. "There are not enough footpaths".
Neighborhood safety	Single item on a 4-point scale, "This is a safe neighborhood".
Parks/playgrounds	As above. "There are good parks, playgrounds and play spaces".
Footpath quality	As above. "The state of footpaths and roads is good".

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Table 3. Adjusted models for PF by child age group ( $N=1,779$ ).

	9-10 year olds (N= 501)	11-13 year olds (N= 793)	14-15 year olds (N= 485)
	Beta	Beta	Beta
<i>Family Characteristics</i>			
Parent age (years)	-.03	-.02	-.02
Parent gender (female)	-.01	-.06	.00
Child gender (female)	.00	<b>-.09**</b>	<b>-.08*</b>
Child disability	.01	.04	.07
LOTE	<b>.10*</b>	<b>.08*</b>	.03
No. children at home $\leq$ 18 years	-.04	-.05	<b>-.08*</b>
Parent employment			
Unemployed vs Employed	.01	.04	.06
Not in labor force vs Employed	.06	.02	.01
Parent without higher education	-.07	-.09**	-.06
Single parent	.05	.02	.00
<i>Parental Experiences</i>			
Attitude	<b>-.11**</b>	-.02	<b>-.18***</b>
Benefit	<b>-.17***</b>	<b>-.20***</b>	-.08
Child's competence	<b>-.24***</b>	<b>-.13***</b>	<b>-.11*</b>
Parenting self-efficacy	-	-	.01
Child without mobile phone	-	-.05	-
Psychological distress	<b>.19***</b>	<b>.13***</b>	<b>.19***</b>
Pressed for time	.05	<b>.06*</b>	-
<i>Social</i>			
Social capital	.03	.06	.05
Perceived disapproval from others	<b>.11*</b>	<b>.23***</b>	<b>.12**</b>
<i>Neighborhood</i>			
Metro location	<b>-.11*</b>	-.05	-.05
Livability	-	<b>.10*</b>	-
Distance to school	.00	-	-
Perceived risk	.03	<b>.10**</b>	<b>.15**</b>
No safe crossings	.01	<b>.07*</b>	-
Busy roads	.04	-	-
Lots of traffic	<b>.11*</b>	.00	-
Not enough footpaths	-	.05	-
Safe neighborhood	.00	-.07	-.07
Good parks, playgrounds	-	-.03	-
SEIFA (less disadvantage)	<b>-.13**</b>	-	-.05
<i>Model R<sup>2</sup></i>	0.37	0.36	0.34

Bolded figures denote significant findings; analyses; \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ ; - denotes variables excluded from adjusted model as not significant at unadjusted level. Note: Numbers changed slightly for individual models due to some missing data.

Table 4. Adjusted models for FoS by child age group ( $N=1742$ ).

	9-10 year olds (N= 495)	11-13 year olds (N= 774)	14-15 year olds (N= 473)
	<i>Beta</i>	<i>Beta</i>	<i>Beta</i>
<i>Family Characteristics</i>			
Parent age	-.04	-.04	-.05
Parent gender (female)	-.01	-.03	.02
Child gender (female)	<b>-.13***</b>	<b>-.14***</b>	<b>-.21***</b>
Child disability	-.04	<b>-.08*</b>	-.02
LOTE	<b>.11**</b>	<b>.09**</b>	<b>.10**</b>
No. children at home $\leq$ 18 years	-.05	-.03	-.02
Household employment			
Unemployed vs employed	.05	.03	.03
Not in labor force vs employed	.05	-.02	-.01
Parent without higher education	<b>-.11**</b>	<b>-.14***</b>	<b>-.08*</b>
Single parent	<b>.08*</b>	.01	.00
<i>Parental Experiences</i>			
Attitude	<b>-.12**</b>	-.05	<b>-.09*</b>
Perceived benefits	<b>-.10**</b>	<b>-.15***</b>	<b>-.10*</b>
Child's competence	<b>-.13**</b>	<b>-.16***</b>	<b>-.13**</b>
Child without mobile phone	-	<b>.10**</b>	-
Psychological distress	.07	<b>.10**</b>	<b>.13**</b>
Previous experience of stranger	-.05	-	-
Pressed for time	.06	-	-
<i>Social</i>			
Social capital	-.01	<b>.12**</b>	.08
Perceived disapproval from others	<b>.17***</b>	<b>.21***</b>	<b>.21***</b>
<i>Neighborhood</i>			
Metro location	<b>-.16***</b>	<b>-.11**</b>	-.07
Distance to school	-.01	*	-
Perceived risk	<b>.12**</b>	<b>.18***</b>	<b>.15***</b>
Livability	.05	<b>.12*</b>	.00
No safe crossings	.02	.04	-.01
Busy roads	.03	-	-
Lots of traffic	<b>.09*</b>	.00	-
Not enough footpaths	.07	-.01	-
Safe neighborhood	<b>-.11*</b>	<b>-.16***</b>	<b>-.13**</b>
Good parks, playgrounds	-.06	-.06	.02
Good quality footpaths and roads	-	-.03	-
SEIFA (less disadvantage)	-.06	-.02	<b>-.12**</b>
Model R <sup>2</sup>	.44	.42	.42

Bolded figures denote significant findings; analyses; \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ ; - denotes variables excluded from adjusted model as not significant at unadjusted level. Note: Numbers changed slightly for individual models due to some missing data.