



# Validity of a scale of neighbourhood informal social control relevant to pre-schoolers' physical activity: A cross-sectional study



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## ARTICLE INFO

### Keywords:

Hong Kong  
Collective efficacy  
Safety  
Physical activity  
Preschool-age children  
Scale validity

## ABSTRACT

Childhood physical activity (PA) is important for health across the lifespan. Time pre-schoolers spend outdoors, which has been associated with more PA, is likely influenced by parents' perception of neighbourhood informal social control relevant to pre-schoolers' PA, defined as the willingness of neighbours to intervene to ensure social order and a safe community environment for young children's active play. To advance measurement of this construct, we assessed factorial and construct validities of the PA-related neighbourhood informal social control scale for parents of pre-schoolers (PANISC-PP). In 2013–2014, Hong Kong primary caregivers ( $n=394$ ) of 3–5 year-old children completed a socio-demographic questionnaire, the preliminary version of the PANISC-PP, and self-report measures of theoretical neighbourhood correlates of PA-related neighbourhood informal social control (perceived signs of physical and social disorder, community cohesion, perceived stranger danger, risk of unintentional injury and traffic safety). The fit of the data to an a priori measurement model of the PANISC-PP was examined using confirmatory factor analyses. As the a priori model showed inadequate fit to the data, the factor structure was re-specified based on theoretical considerations. The final measurement models of the PANISC-PP showed acceptable fit to the data and consisted of three correlated latent factors: "General informal supervision", "Civic engagement for the creation of a better neighbourhood environment" and "Educating and assisting neighbourhood children". The internal reliability of the subscales was good (Cronbach's  $\alpha$  values 0.82–0.89). Generalised additive mixed models indicated that all subscales were positively associated with community cohesion and scores on the subscale "Educating and assisting neighbourhood children" were related in the expected direction to all indicators of traffic and personal safety, supporting construct validity of the PANISC-PP. This study suggests that the PANISC-PP is a reliable and valid instrument for assessing parents' perceived neighbourhood informal social control related to pre-schoolers' PA.

## 1. Introduction

Encouraging adequate levels of physical activity (PA) in pre-schoolers is important for health in childhood and across the life-span (Adamo et al., 2014; Carson et al., 2016; Innella, Breitenstein, Hamilton, Reed, & McNaughton, 2016; Telama et al., 2014). Unfortunately, the prevalence of pre-schoolers meeting the current guideline of three hours of PA per day (Pate & O'Neill, 2012) is typically low worldwide, ranging from as little as 5% to around 50% (Cardon & De Bourdeaudhuij, 2008; Hinkley, Salmon, Okely, Crawford, & Hesketh, 2012; Pate et al., 2015; Pujadas Botey, Bayrampour, Carson, Vinturache, & Tough, 2015).

As posited by social ecological (Stokols, 1996) and social cognitive theories (Bandura, 2004), PA behaviour is influenced by interacting individual, social and environmental factors. Environmental factors are particularly important for pre-schoolers as more time spent outdoors has been shown to be associated with more PA (Cerin et al., 2016; Hinkley, Crawford, Salmon, Okely, & Hesketh, 2008; Hinkley, Salmon, Okely, Crawford, & Hesketh, 2012; Sallis et al., 1993). Due to their low level of autonomy, pre-schoolers' time outdoors is dependent on parents' safety perceptions of the environment, especially the immediate neighbourhood environment where most young children are likely to play (Cerin et al., 2016). In fact, parental perceptions that the neighbourhood was unsafe has been associated

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<http://dx.doi.org/10.1016/j.ssmph.2016.11.007>

Received 17 August 2016; Received in revised form 2 November 2016; Accepted 28 November 2016

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with their preschool children not being allowed to play outdoors (O'Connor et al., 2014a) and being less active (Datar, Nicosia, & Shier, 2013).

Parental perceptions of neighbourhood safety do not necessarily reflect objectively measured safety (Carver, Timperio, & Crawford, 2008; Gielen et al., 2004; Kimbro & Schachter, 2011; Soltero, Cerin, Lee, & O'Connor, 2016). They can be influenced by other factors, such as the perceived level of collective efficacy within the neighbourhood (Sampson, Morenoff, & Earls, 1999), which has been shown to be associated with mothers' fear of their children playing outdoors (Kimbro & Schachter, 2011). Collective efficacy for children is task specific and related to adults' shared expectations and mutual engagement in the active support and social control of children (Sampson et al., 1999). It is a combination of child-centred mutual trust and community solidarity (i.e., social cohesion) and willingness to intervene to ensure the maintenance of social order and safety in the community (i.e., informal social control; ISC) (Sampson, Raudenbush, & Earls, 1997). Child-centred ISC encompasses informal processes such as educating children about safety, stopping and preventing hazardous behaviours or situations, and assisting children in need. Parents are more likely to allow their children to play outdoors if residents of the community share mutual health-related goals (e.g., importance of being physically active) and there is a high level of child-centred neighbourhood ISC that help shape a healthy social environment by reducing the incidence of undesired events, such as neighbourhood safety concerns (McNeill, Kreuter, & Subramanian, 2006). In fact, a recent study on parents of Latino preschool-age children found child-centred neighbourhood ISC to be positively associated with parenting practices encouraging participation in PA and with having outdoor toys available to children for play (O'Connor et al., 2014b). While the importance of neighbourhood ISC for engagement in PA has been previously highlighted in theoretical papers (McNeill et al., 2006) as well as empirical studies on school-age children and adolescents (Duke, Borowsky, & Pettingell, 2012; Foster, Villanueva, Wood, Christian, & Giles-Corti, 2014), findings on young, preschool-age children are lacking.

To examine the potential effects of parent-perceived neighbourhood ISC on their PA-related parenting practices and the PA level of their preschool-age children, appropriate validated measures are needed. Until recently, measures specifically tailored to preschool-age children's PA participation were not available. Coulton and colleagues (1995) and Cerin et al. (2015) respectively developed scales of child-centred neighbourhood ISC for parents of U.S. and Latino preschool-age children. However, these scales were constructed with the aim of assessing social processes primarily focused on the enhancement of neighbourhood safety for young children in general rather than with respect to their PA participation. Virtually all items included in these two instruments describe processes pertaining to neighbourhood traffic safety and safety from crime. However, as noted by a recent qualitative study on Chinese parents of preschool-age children (Anonymous, 2014), child-centred neighbourhood ISC relevant to children's PA can potentially target factors other than traffic and crime safety. These, for example, include instructing children how to avoid injuries and conflicts with other children while playing outdoors, teaching children PA-related skills, and participation in civic actions for the creation and enhancement of neighbourhood spaces and facilities appropriate for young children.

To address the need for an instrument of child-centred PA-related neighbourhood ISC for parents of young children, a preliminary version of a scale (thereafter, PA-related neighbourhood ISC for parents of pre-schoolers or PANISC-PP) was recently developed based on formative qualitative research and expert input to ensure content validity (Suen, Cerin, & Mellecker, 2014). Although the PANISC-PP was developed in a Hong Kong Chinese setting, 13 of its 20 items were identical or comparable to those included in the measure of child-centred neighbourhood ISC developed for a U.S. Latino population

(Cerin et al., 2015). The remaining seven items covered aspects of ISC that were more specifically related to PA (improving PA skills and avoiding unintentional injuries) and described practices that are typically used in most cultures (i.e., they were not Chinese-culture specific). This makes the PANISC-PP potentially applicable to other populations of parents of preschool-age children. Although the scale showed good test-retest reliability and acceptable levels of internal consistency (Suen et al., 2014), further validation work was necessary as its factorial and construct validities had not been examined. Hence, the aim of this study was to assess the factorial and construct validities of the PANISC-PP (Suen et al., 2014). Mirroring a previous study on Latino parents (Cerin et al., 2015), construct validity assessment was based on an examination of the associations of dimensions of the PANISC-PP with perceived neighbourhood attributes hypothesised to be positively [community cohesion (Sampson et al., 1999) and traffic safety (Inclán, Híjar, & Tovar, 2005)] or negatively [signs of physical and social disorder (Cradock, Kawachi, Colditz, Gortmaker, & Buka, 2009), stranger danger (Sampson et al., 1999) and risk of unintentional injury (Carver et al., 2008; Suen et al., 2014)] related to child-centred neighbourhood ISC relevant to engagement in PA.

## 2. Materials and methods

### 2.1. Participants and procedures

A convenience sample of 394 Chinese-speaking primary caregivers of 3–5 year old children was recruited from kindergartens, preschool playgroup centres and Maternal Care and Health Clinics (MCHC) of the Department of Health of the Hong Kong Special Administrative Region (SAR) in 2013 and 2014. Recruitment locations were stratified by administrative-area-level income (monthly domestic household income > HK\$ 24,500 representing medium-to-high income and ≤HK\$ 24,500 representing low-to-medium income) and population density (> 9000 residents/km<sup>2</sup> representing high density and ≤9000 residents/km<sup>2</sup> low density areas) because these two characteristics might influence the type and levels of parents' perception of PA-related ISC and their children's PA (O'Connor et al., 2014b; Cohen, Finch, Bower, & Sastry, 2006; Suen, Cerin, & Wu, 2015a).

Participants were included in the study if they identified themselves as being a primary caregiver of at least one 3–5 year-old Chinese-speaking child living in Hong Kong. Exclusionary criteria were parents/primary caregivers of children with a disease affecting their PA behaviour or cognitive functioning, and those who were unable to read and write in Chinese. All eligible participants provided written informed consent. They were asked to complete a socio-demographic questionnaire, the preliminary version of the PANISC-PP, and self-report measures of perceived signs of physical and social disorder, community cohesion, perceived stranger danger, risk of unintentional injury and traffic safety. Additionally, participants' census administrative areas of residence (named Tertiary Planning Units or TPUs) were recorded for analytical purposes (see Data analysis plan). The characteristics of the sample can be found in Table 1. Participants represented 96 TPUs (~4 participants per TPU).

### 2.2. Measures

*Child-centred PA-related neighbourhood ISC* was measured using a 20-item scale developed for Hong Kong Chinese-speaking parents/caregivers of preschool-age children (PANISC-PP) (Suen et al., 2014), with items grouped into three *a priori* determined subscales: "Personal Involvement and general informal supervision" (5 items; e.g., supervise the neighbourhood children at all times), "Civic engagement for the creation of a better neighbourhood environment" (7 items; e.g., organize meetings with the police and other organizations to promote safety) and "Educating and assisting neighbourhood children" (8 items; e.g., make sure the neighbourhood children do not play in dangerous

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