Parental support of children's physical activity in Hong Kong

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(Original Article)

Abstract

This study (a) presented a structural model for examining how parents' perceptions of their children's competence, exercise benefits, exercise barriers and neighbourhood safety influenced parental support and their children's physical activity (PA); and (b) examined the mediation effect of parental support on children's PA. Parents of 478 children aged 6–9 years were recruited in the study. The parents were asked to complete a questionnaire assessing the aforementioned constructs and report their children's PA outside school time over seven days. Structural Equation Modelling was applied to examine the relationship between parents' perceptions and the reported PA of their children. The results revealed that (a) only parental support predicted children's PA directly, and (b) parents' perceptions of their children's competence and exercise benefits of their children predicted parental support and, in turn, predicted children's PA. PA interventions for Hong Kong children should emphasize increasing parental support in addition to enhancing parents' confidence and ability to promote their children's PA by providing positive feedback, acting as active role models, and facilitating participation in PA. Additional studies are required to examine children's PA from the perspective of parents.

Keywords

Exercise, Parents' perceptions, Parent proxy report PA, Chinese (201 words)

Introduction

A high percentage of children in Hong Kong are inactive. The Sport Commissions of the Hong Kong Special Administrative Region (SAR) Government (2012) stated that in young children aged 7–12 years, only 8.3% of them engaged in sufficient physical activity (PA; i.e. accumulated at least 60 min of moderate or above intensity PA, every day in a week), and 40% of them were sedentary, spending more than 5 hours on activities like studying and screen times after school. This inactive and sedentary lifestyle contributes to childhood obesity. Notably, increasing childhood obesity results in considerable financial loss and human cost to society in the future. The estimated and related costs in Hong Kong public hospitals increased by 47%, from HK$2.29 billion in 1998 to HK$3.36 billion in 2002 (Ko, 2008). This thus provides a strong rationale for gaining an improved understanding of the factors that motivate children's PA.

In recent years, increasing umbers of researchers have applied ecological models to understand children's PA (Sallis and Owen, 1999). The ecological model presented by a previous study explains that a person's PA participation level is determined by the interaction between the person and his or her environment (Sallis and Owen, 1999). This model considers PA as a complex phenomenon that is engendered by the interaction between multiple levels of factors. The multiple levels of factors affecting PA include intrapersonal (e.g. biological, psychological), interpersonal/cultural, organizational, environmental (e.g. neighbourhood environment), and political factors (e.g. laws and rules). Burdette and Whitaker (2005) revealed that young children living in neighbourhoods that their mothers perceived as 'unsafe' spent less

time playing outdoors and more time watching television compared with those children whose mother perceived their neighbourhoods as "safe". Recently, parental safety concerns outside and inside the home were found to discourage young children's PA in Hong Kong (Suen, Cerin, and Wu, 2015). Children's participation in PA is thus affected not only by the availability of facilities, but also affected by parents' concerns about their safety (e.g. *perceived neighbourhood safety*; McNerish and Roberts, 1995).

Parents' influence on children's PA

Apart from the environmental factors, the interpersonal factors, particularly children–parent interactions, have gained substantial attention from researchers for understanding children's PA (Boiché et al., 2011; Fredricks and Eccles, 2005; Horn, 2004; Partridge et al., 2008; Yao and Rhodes, 2015). Researchers (Horn, 2004; Partridge et al., 2008) have suggested that parents' influence on their children's PA peaks at the earliest stages of their children's developmental process (i.e. aged 10 or younger) and diminishes through adolescence. This is because children spend the bulk of their time with their families before the influence of their peers increases as they age. Pugliese and Tinsley (2007) conducted a meta-analysis to integrate studies that have investigated the relationship between parents' behaviours (i.e. modelling, encouragement, instrumental behaviours, general support and work habits) and children/adolescent PA levels. The unweighted mean and median effect sizes (as indexed by *r*) of overall parental behaviour were .17 and .13, respectively, representing a 17% difference in the risk of being inactive (vs. being active) among children whose parents do not exhibit supportive behaviours such as encouragement. A recent meta-analysis of parental correlates of

children/adolescent PA (Yao and Rhodes, 2015) reconfirmed the overall moderate effect size of parental support to children's PA (r = .36).

Theoretical background for understanding parents' influence on children's PA

Eccles and colleagues (1983) generated a model that provides a conceptual framework for studying parents' influence on children's PA. The model is based on the assumption that a person's decision to participate in activities is made in the context of various choices, and understanding how parents influence one's decisions is imperative. This model was originally utilized to examine the influence of parents' behaviours and beliefs on children's motivations in mathematics and English. Parents' belief system may influence their interaction with their children, such as the extent of their support to children's PA. All these factors may eventually shape the children's PA participation.

Parents' belief system

A vital component of the Eccles' Expectancy-Value Model is parents' expectation of their children's expectancy of success. Children's expectancy of success is defined as 'children's beliefs about how well they will do on upcoming tasks, either in the immediate or long-term future' (Eccles, 1983, p. 94). It refers to the perceived probability of success in a specific domain such as a sport or PA. Another concept closely related to the expectancy of success is one's own perception of ability, which is defined as 'individuals' evaluations of their competence in different areas' (Eccles, 1983, p.94). Many researchers have used these concepts interchangeable or other researchers have combined these two concepts into one construct (Eccles and Wigfield,

1995; Fredricks and Eccles, 2005). Dempsey and colleagues (1993) found that children's activity levels increased if parents held greater perception of children's competence. Similar results were also observed in a Hong Kong study (Cheung, 2004). Parents' beliefs about their children's physical competence can shape their children's activity choices indirectly through the children's personal perception of competence and the relative value of various activities. Parents provide unequal support to their children in various domains depending on their evaluation of children's previous performance. For instance, if parents perceive that their children are more skilled at playing volleyball than at singing, they may provide more support to their children to enable them develop their volleyball skills (e.g. enrolling them in volleyball lessons vs. vocal lessons), while devoting less effort to nurturing their children's singing skills. In the current study, parents' perceptions of their children's competence is defined as how parents perceived their children's physical abilities in PA.

Another vital component of the Eccles' Expectancy-Value Model is parents' subjective task value, representing parents' beliefs about the value or importance of an achievement domain. Subjective task value refers to how a task meets the different needs of people (Eccles et al., 1983), and it comprises four components: attainment value, interest value, utility value, and cost (Eccles, 2005). Attainment value refers to the importance of doing well on a given task. Interest value is defined as the fulfilment that one perceives from executing a specific task. Utility value refers to the perceived usefulness of the actions that link the working task to the future plan, such as how PA may enhance one's quality of life or lifespan while cost refers to perceived consequences of participating in an activity, including the amount of effort required to

succeed in the task, the time lost for engaging in other valued activities, and negative psychological states resulting from struggle or failure in the task.

Attainment value, interest value, and utility value are 'best thought of as attracting characteristics that affect the positive valence of the task…' (Eccles and Wigfield, 1995, p.216). These values are coincided with "perceived exercise benefits" (Sechrist et al., 1987) as one's evaluation of the potential gain from engaging in PA. By contrast, cost is 'best thought of as those factors… that affect the negative valence of the activity' (Eccles and Wigfield, 1995, p.216). Therefore, the meaning of cost is in line with the perceived exercise barriers (Sechrist et al., 1987) as one's evaluation of the potential loss from engaging in PA. Hence, in the current study, perceived exercise benefits and perceived exercise barriers are equivalent to 'attainment value, interest value, and utility value' and 'cost', respectively.

Researchers have examined how parents' perceived benefits and barriers to their children affects the children's exercise or PA (McMurray et al., 1993; Ransdell et al., 2005). Several studies have found no relationship between parents' perceptions of exercise benefits and barriers and children's PA engagement (McMurray et al., 1993; Mota and Queiros, 1996). Nevertheless, certain investigators (Dempsey et al., 1993) disagreed; they revealed that parents' perceptions of exercise benefits and barriers demonstrated a moderate relationship with children's participation in sports. With this information, they asserted that parents might communicate the value that they attach to PA by expressing positive or negative messages regarding various activities. Furthermore, parents

conveyed their value towards PA through role modelling, encouragement, and facilitation. These results were consistent with those of Eccles and colleagues (1983).

Relationship between parents' belief system and their behaviours in children's PA

A positive parents' belief system to children's PA increases parental support for children's PA and translates into successful experiences, positive self-esteem, and greater expectations for children's PA. Boiché and colleagues (2011) revealed that parents' child-specific beliefs (e.g. parents' perceptions of their children's competence and value of activity) predicted parents' behaviours (e.g. active involvement, praise and understanding). When parents estimated that sport success was important and the physical activity was beneficial to children, they tended to adopt praise and supportive behaviours regarding children's PA. Similarly, Wheeler (2012) revealed that parents held specific goals (e.g. outcomes gained through PA - parents' perceived exercise benefits) regarding their children's PA and employed a set of supportive or unsupportive strategies and practices (e.g. support) to achieve these goals. Therefore, parents' belief system stimulates them to provide different degrees of support to their children's PA through encouragement, facilitation and role modelling on the basis of their own lifestyles. These behaviours eventually influence children's involvement in PA.

Overall, in the reviewed literature, most studies have examined factors influencing children's participation in PA (Garcia et al., 1995, Sallis and Owen, 1999); however, less effort has been devoted to examining parents' perceptions of children's PA. Direct information from parents (Boiche, Guillet, Bois, and Sarrazin, 2011; Brustad, 1992) is required for examining parents' beliefs and behaviours regarding children's PA. In Hong Kong, only a few parent influential

factors have been actually examined such as parents' PA (Cheung, 2004; Cheung, 2006; Lau and Leung, 2003). These studies have examined children's PA from the perspectives of children or both children and their parents, but no study has emphasised studying children's PA from the parents' perspective. In addition, the precipitating factors that may affect the degree of parental support towards their children participating in PA, such as parents' perceptions of their children's competence, remain unclear (Fredricks and Eccles, 2004). Next, related studies have mainly been conducted on European–American populations; therefore, studies from Eastern countries (e.g. Hong Kong) are required to yield more diverse samples to enhance the knowledge of this subject area (Yao and Rhodes, 2015). Perhaps the effect size of parents' behaviours and beliefs on children's PA is higher because of Confucianism in Eastern countries such as Hong Kong. Confucianism is a collective culture which highlights the family unity. Parents are required to regulate their children's lives and daily activity while children show obedience to their parent and seldom conflict with adults (Wright and Macdonald, 2010).

This study filled the aforementioned research gaps and proposed a theoretical framework (Figure 1) for studying parents' perceptions of their children's PA. We hypothesised that (a) the parents' perceptions of their children's competence, exercise benefits, exercise barriers, and neighbourhood safety significantly influenced parental support and their children's PA; and (b) parents' perceptions of their children's competence, exercise benefits, exercise barriers, and neighbourhood safety were associated with their children's PA through parental support for PA.

[INSERT FIGURE 1 ABOUT HERE]

Methods

Participants

Cross-sectional data presented in this paper were drawn from 625 parents of students aged 6–9 years in primary schools in Hong Kong. For each child, only one parent answered the questionnaire. This sample size marginally meets the sample size requirement (i.e. 10 cases for each estimated parameter) suggested by Bentler and Chou (1987). The study was approved by the affiliated university.

After data screening, 478 cases went into further data analyses. Among 478 parents, most of them were mothers (74.5%) and were from two-parent families (93.7%). Approximately 30% of the parents had attained tertiary level or postgraduate education. More than half of them were full-time workers (53.3%), whereas 35.1% of them were housewives or were retired. Nearly 35% (34.7%) of the parents reported that their monthly income was HK$30000 or higher. About 45% (47.7%) of parents had a monthly income 'HK$10,000- $29,999' (Table 1).

Measures

Parents were requested to respond to questions about their demographic information, including their age, gender, education level, income, work, parenting status, and children's gender. The measurement of the studied variables is described below:

Parents' perceptions of children's competence in PA (PPCC). Seven items of Harter's Perceived Competence Scale (Harter, 1982) were used to assess parents' perceptions of children's competence in the physical domain. Dempsey et al. (1993) reported an alpha coefficient of .81 for this 7-item scale and this scale has been used in Chinese children (Cheung, 2004). This scale applied Harter's structural alternative format, in which respondent decided whether the statement was 'really true for my child' or only 'sort of true for my child'. An example of an item on the scale was 'Some kids are good at sports but some kids are not good at sports'.

Parents' perceptions of neighbourhood safety (PPNS). Parents' perceived neighbourhood safety was measured using the disorder dimension of the Neighbourhood Environment for Children Rating Scales (Coulton et al., 1996). This scale measured neighbourhood environments through the perceptions of caregivers of young children sampled from high- and low-risk block groups. Reliability coefficients for individual level (Cronbach's alpha = .96) and aggregate level (generalisability coefficient = .84) were acceptable. The 'Disorder' dimension recorded perceptions of deleterious conditions in a neighbourhood such as loitering. This scale comprised a total of 8 items asking parents how often they found certain disorders in their surroundings such as gang activity and misbehaving groups of youths or adults. The respondents' answers ranged from 1 = 'never' (very safe) to 4 = 'frequently' (not safe).

Parents' perceptions on exercise benefits of their children (PPEBe). This was assessed using the 29-item Benefits Scale of Exercise Benefits/Barriers Scale (Sechrist et al., 1987). This scale comprised five factors that were associated with the items: life enhancement (eight items), physical performance (eight Items), psychological outlook (six items), social interaction (four

items), and preventive health (three items). An example of an item on the scale was 'Exercising makes my children feel relaxed'.

Parents' perceptions on exercise barriers of their children (PPEBa). This was measured using the 14-item Barriers Scale of Exercise Benefits/Barriers Scale (Sechrist et al., 1987).This scale involved four subfactors, including exercise milieu (six items), time expenditure (three items), physical exertion (three items), and family discouragement (two items). An example of an item on the scale was 'Exercise facilities do not have convenient schedules for my children'.

The items for the 29-item Benefits Scale and 14-item Barriers Scale of Exercise Benefits/Barriers Scale were originally obtained inductively from interviews and from the literature (Sechrist et al., 1987). Test-retest reliability was found to be .89 on the total instrument, .89 on the Benefits Scale and .77 of the Barriers Scale (Sechrist et al., 1987). Because questions on exercise benefits and barriers to children were answered by parents, items were changed from 'Exercising takes too much of my time' to 'Exercising takes too much of *my children's* time'. The instrument had a four-response, forced-choice Likert format ranging from 4 = 'strongly agree' to 1 = 'strongly disagree'.

Parental support of their children's engagement in PA (PS). Parental support was measured using a 5-item Parental Support Scale (Trost et al., 2003). This scale assessed parents' encouragement, involvement and facilitation. Moreover, Trost et al. (2003) reported that this scale demonstrates acceptable internal consistency (e.g. Cronbach alpha = .78). An example of an item on the scale was 'how often do you encourage your children to do PA'. A 5-point Likert-type scale ranging from 1 = 'none' to 5 = 'daily' was used to gauge the responses.

Parents' report of amount/level of their children's engagement in PA (children's PA). The The Modified Physical Activity Questionnaires for Children (MPAQ-C) was used to assess parents' reports on their children's engagement in PA outside school time during the past seven days. It originally comprised a total of nine items measuring the frequency at which children engage in PA in various situations and periods (e.g. school, recess, after school, and evening; Crocker et al., 1997). The original 9-item PAQ-C has been shown to have moderate to high test-retest reliability in children aged 9–14 years (r = 0.75 for males and r = 0.82 for females; Crocker et al., 1997). However, 3 items were removed from the current study because parents could not observe their children's PA under certain circumstances. One of the removed items was 'In the last 7 days, what did you do most of the time *at recess*?' Each item was scored on a five-point Likert-type scale ranging from 1 = 'none' to 5 = '6 or 7 times last week'.

Procedure

We gave a covering letter to primary school principals requesting their schools' participation in this study. When a principal agreed, the school was asked to suggest data collection dates to ensure that children would not be out of school because of extracurricular activities or school holidays. During the school visits, one parent per student aged 6–9 years was requested to participate in the study. The parents were given a letter describing the nature of the study and requesting their participation. Parents were informed that the questionnaire would take approximately 10 minutes to complete.

Data analyses

Structural Equation Modelling (SEM) was used to assess the relationships among the dependent variable (i.e. Parents' report on their children's PA) and associated constructs (i.e. PPCC, PPNS, PPEBa, PPEBe, and PS). Data analyses were performed using maximum-likelihood estimation in both LISREL 9.1 (Jöreskog and Sörbom, 1993) and SPSS (Version 21.0). The two-step procedure suggested by Anderson and Gerbing (1988) was used to test the theoretical relationships among the latent variables (see Figure 2). The first step involved executing a series of confirmatory factor analysis (CFA) procedures and the overall measurement model to test the measurement models. The second step entailed using a structured model to test the proposed relationships among the studied constructs.

Multiple fit indices were used to assess the model fit, as recommended by Kline (1998). These indices included relative chi-square (chi square / df), root-mean-square error of approximation (RMSEA), standardised root mean residual (SRMR), non-normed fit index (NNFI), and comparative fit index (CFI). SRMR and RMSEA values lower than .08 are generally considered to indicate an acceptable fit (Hu and Bentler, 1999), and NNFI and CFI values higher than 0.90 are considered to indicate a satisfactory fit to data. A relative chi-square value ranging from 2.0 to 5.0 is considered desirable (Tabachnick and Fidell, 1989). Since chi square may vary according to sample size, relative chi square is applied in order to make it less sensitive to the sample size.

INSERT FIGURE 2 ABOUT HERE

Results

Measurement models and overall measurement model

Table 2 shows the results of the CFA of all individual measurement model and overall measurement model. Measurement model of MPAQ-C (χ^2 (9) = 42.74, $p < .001$; χ^2/df = 4.749; CFI = .953; NNFI = .922; SRMR = .040; RMSEA= .088 [90% CI = .063 to .116]), parents' perceptions of their children's competence (χ^2 (14) = 59.99, $p < .001$; χ^2 /df = 4.285; CFI = .972; NNFI = .957; SRMR = .031; RMSEA= .083 [90% CI = .062 to .105]) demonstrated acceptable to good model fit.

In parents' perceptions on exercise benefits of their children, the initial model (i.e. PPEBe 1) did not fit the data well (χ^2 (367) = 1296.23, p < .05; χ^2/df = 3.531; CFI = .824; NNFI = .806; SRMR = .070; RMSEA= .073 [90% CI = .069 to .077]). Due to the high standardized residual of items (-3.85-5.36) (i.e. 29, 36, 41, 43, 8, 38 and 5), these 7 items were removed. The modified model (i.e. PPEBe 2) then showed a good model fit (χ^2 (199) = 564.95, $p < .05$; χ^2/df = 2.838; CFI = .904; NNFI = .888; SRMR = .050; RMSEA= .062[90% CI = .056 to .068]). Similarly, the initial model (i.e. PPEBa 1) of parents' perceptions of exercise barriers to their children fitted poorly (χ^2 (71) = 305.25, $p < .05$; χ^2/df = 4.299; CFI = .827; NNFI = .779; SRMR = .071; RMSEA= .083[90% CI = .074 to .093]). Items 16 and 40 were found to be high in standardized residual (6.90, 4.66) and they were then removed. The modified model (i.e. PPEBa 2) then demonstrated acceptable to good model fit (χ^2 (48) = 156.99, $p < .05$; χ^2/df = 3.270; CFI = .905; NNFI = .870; SRMR = .053; RMSEA= .069[90% CI = .057 to .081]).

For parental support, the initial model (PS 1) was poorly fitted to the data ($\chi^2(5) = 33.53$, $p < .001$; $\chi^2/df = 6.706$; CFI = .965; NNFI = .930; SRMR = .036; RMSEA= .109 [90% CI = .076 to .146]). The standardized residual of a pair of items (i.e. Item 1 and item 5) was over 2. As suggested by Hu and Bentler (1999), item 5 was removed due to high standardized residual and content redundancy. The modified model (PS 2) resulted in a substantial improvement in model fit, ($\chi^2(2) = 6.56$, $p < .05$; $\chi^2/df = 3.125$; CFI = .992; NNFI = .977; SRMR = .020; RMSEA= .069 [90% CI = .014 to .131]).

For parents' perceived neighborhood safety, the initial model (PPNS 1) did not fit the data very well ($\chi^2(20) = 333.40$, $p < .001$; $\chi^2/df = 16.670$; CFI = .881; NNFI =. 834; SRMR = .074; RMSEA= .181 [90% CI = .164 to .198]). Similarly, due to the large standardized residuals (i.e. -1.77 – 6.021), items 1, 3 and 7 were removed. The modified model (i.e. PPNS 2) then showed a better model fit, ($\chi^2(5) = 13.79$, $p < .05$; $\chi^2/df = 2.758$; CFI = .993; NNFI = .986; SRMR = .019; RMSEA= .061 [90% CI = .024 to .100]). Overall, the fit indices showed the overall measurement model had an acceptable fit ($\chi^2(434) = 1066.10$, $p < .05$; $\chi^2/df = 2.456$; CFI = .892; NNFI = .884; SRMR = .114; RMSEA= .055[90% CI = .051 to .059]).

[INSERT TABLE 2 ABOUT HERE]

Structural model

Table 3 presents the descriptive statistics and intercorrelations for all studied variables. The proposed structural model is shown in Figure 2. Circles represent latent variables and rectangles represented measure variables. All standardized direct, indirect, and total effects are

tested simultaneously and shown in Table 4. The proposed model was found to fit the data well as indicated by the fit indices ($\chi^2(419) = 754.85$, $p < .001$; $\chi^2/df = 1.802$; CFI = .943; NNFI = .936; SRMR = .047; RMSEA= .041 [90% CI = .036 to .046]).

Overall, the independent variables explained 49.6% of the variance in children's PA and 12.1% of the variance in PS. Only PS predicted parents' report children's PA directly ($\beta = 68$, $p < .01$). Indirectly, both PPCC ($\beta = .18$, $p < .01$) and PPEBe ($\beta = .29$, $p < .05$) predicted PS but in turn, PS predicted children's PA ($\beta = .68$, $p < .01$).

[INSERT TABLE 3 and 4 / FIGURE 2 ABOUT HERE]

Discussion

This study (a) presented a structural model for examining how parents' perceptions of their children's competence, exercise benefits, exercise barriers, and neighbourhood safety influences parental support and their children's physical activity (PA); and (b) examined the mediation effect of parental support on children's PA. The main findings in this study were (1) Only PS could predict children's PA and (2) Both PPCC and PPEBe could predict children's PA through PS.

As expected, PS was associated with children's PA. This result partially supports the application of Eccles' Expectancy-Value Theory to understanding the influence of parental support on children's PA. Parental support by providing positive feedback, acting as active role models and facilitating participation in PA promotes children's PA (Eccles, 1983). Moreover, this result is supported by the findings of previous studies that there is a significant

effect size of parental support to children's PA (Cheung, 2006; Pugliese and Tinsley, 2007; Trost and Loprinzi, 2011; Yao and Rhodes, 2015). When Hong Kong's culture is considered, this result is not unexpected. Confucianism has been embraced in Chinese culture, including in Hong Kong, for more than 2000 years. Regarding parenting, parents represent an authority figure in a family. All family members, including mothers, should be obedient to the father, the family head (Wright and Macdonald, 2010). Children tend to obey parents' behaviours (e.g. positive parental support) and accept parents' belief system, resulting in more engagement in physical activity. Therefore, with the effect of positive PS on children's PA, children's increased engagement in PA is reasonable.

Apart from the direct effect of PS on children's PA, PPCC and PPEBe were indirectly linked to PS and, subsequently, to children's PA. These results are also supported from a theoretical perspective. Eccles' Expectancy-Value Theory (Eccles, et al., 1983) explains that a person's PA participation is affected by his or her significant others' expectancies of success and his or her subjective task value. The combination of parents' beliefs (i.e. PPCC and PPEBe) affects or determines parents' behaviours towards their children, such as the degree of parental support in role modelling, encouragement and facilitation in children's PA.

In this study, PPEBe was a subjective task value of children's PA. On the basis of Eccles' theory, PPEBe determines the degree to which parents provide support to their children. The more the parents value PA, the more effort they expend in providing their children with the resources to be active within the achievement domain (i.e. PA). These notions are supported by the studies of Loprinzi and Trost (2010) and Trost et al. (2003).

In contrast to our expectation, PPCC failed to predict children's PA in the current study, despite the critical level (i.e. *t*-score) approaching a significant level. This result is inconsistent with the findings of Bois and colleagues (2005). Nonetheless, we found that PPCC significantly predicted children's PA output through PS; therefore, PS was a mediator between PPCC and children's PA in this study. In most instances, parents who observed their children's competence in a PA domain discovered their children's interest in sports, and were able to determine their children's talents and temperaments in PA. Parents' observation developed parents' perceptions of their children's physical competence, which helped them in interpreting the achievement-related information in their children's PA. They then determined the activity domains in which their children were more likely to succeed and hence provided more support to them in such domains.

Perceived neighbourhood safety had an insignificant influence on both children's PA output and parental support. Our finding does not support the social-ecological model of health, highlighting the interaction between a person and his or her environment (Sallis and Owen, 1999). Safety may not be a critical concern for children's participation in PA in Hong Kong because Hong Kong is one of the safest cities in the world. According to the ECA International Location Ratings system (2012), Hong Kong ranked 11th in the world and the 3rd in Asia in an assessment of overall quality of life including personal safety (ECA International, 2012). Such high environmental safety reduced the explanatory power of perceived neighbourhood safety regarding the variance between children's PA and parental support. The scarcity of related research and a relationship between perceived neighbourhood safety and children's PA pose a

definite research gap that requires additional studies to determine the environmental factors that may affect children's PA from parents' perspective.

Finally, this study made a strong attempt to understand parents' perceptions of children's PA in Hong Kong, whereas most previous studies examining children's PA were concentrated in Western countries. In particular, the previous related study (Cheung, 2006) conducted in Hong Kong targeted older children (aged 9–12 years). The current study was aimed at understanding the determining factors influencing younger children's PA in order to creating age-specific interventions for children aged 6–9 years. Moreover, the structural model in this study explained about 50% of children's PA, which is higher than the average effect size of previous related studies reviewed by Pugliese and Tinsley (2007).

Implications

This study confirms the importance of parental support in influencing younger children's PA. Parents providing more support to their children can promote the children's PA. Therefore, parents may increase their children's PA participation by engaging in PA with their children, educating them about the value of PA, providing them with positive feedback regarding their abilities, and providing financial support and transportation (i.e. parental facilitation). In addition, the results suggest the importance of implementing family-based and children–parent interventions to promote children's PA in the future (Yao and Rhodes, 2015). On a larger scale, governments may work towards rendering our environments friendly for conducting PA. With

these efforts, parents may become more active, and this may help provide more PA opportunities for their children.

By applying our results, parents can enhance their children's participation in PA through PPCC and PPEBe. This can be achieved by providing age- or skill-level-appropriate PA opportunities to children and helping parents adopt suitable parenting styles or perceive an appropriate level of PPCC. Next, implementing effective mass media campaigns can enhance PPEBe.

Although this study yielded valuable findings, it had several limitations. First, the questionnaires were self-administrated, which may have led to social desirability bias. Parents might have responded to the questionnaires in a manner (e.g. over-report their children's PA) consistent with social norms and this tendency consequently lowered the validity of the study. findings. Second, this study involved a cross-sectional design in which all data were collected at one time. Since parents' influence on children's PA changed as children age, a longitudinal study should be conducted in the future for investigating the changes in parents' influence on children's PA at multiple times. Third, in this study, only five items were used for measuring general parental support, which might reduce the ability to examine specific dimensions of parental support such as parent role modelling, facilitation and encouragement. Well-developed scales with specific measurement dimensions are necessary to explore parental support comprehensively. Fourth, the results of this study might also be affected by the 'halo effect' that indicated that parents might tend to answer all questionnaire scales in a desired and similar direction. Fifth, one parent per child was asked to complete the questionnaires, and most of the respondents

were mothers; therefore, researchers in future studies may request both fathers and mothers to participate in completing questionnaires to gain an enhanced understanding of gender biases and their influence on children's PA. Sixth, the structural model indicated that approximately 50% of children's PA was influenced by other predictors that were not within the scope of this study; examples of such predictors include other negative dimensions of parent behaviours (e.g. pressure or controlling behaviours) that may induce children to cease participating in PA. These potential predictors, suggested by Sheridan et al. (2014), may be investigated in the future. Seventh, although this study attempted to explore how parental support influences children's PA in Eastern countries, cross-cultural studies are warranted in the future. Finally, to fully understand how children's PA is determined, other socializing agents such as siblings, peers, and teachers should be included in future studies.

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