Making plans to facilitate young children's physical activity: The role of psycho-social mediators and moderators

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Abstract

Despite the childhood benefits gained from engaging in adequate physical activity, Australian preschool-aged children are reported to spend little time being physically active. Parental planning is important to engaging preschool-aged children in physical activity. Behavioral barriers, normative support, and self-efficacy have been identified as key determinants of parental decision making. However, the interplay among these factors is not well understood. The aim of this study was to examine the role of these psycho-social variables on parents' planning and behavior for their preschool-aged children's physical activity. A survey at two points in time was conducted in 208 Australian parents ($n = 139$ mothers, $M_{age} = 36.43$ years, $SD = 5.04$; $n = 69$ fathers, $M_{age} = 36.33$ years, $SD = 6.5$) of children aged between 2 and 5 years. A conditional process analysis was conducted that integrates mediation and moderation analyses. The results showed that planning and behavioral barriers predicted behavior, with a moderation effect also identified; more planning helped compensate for barriers. Normative support predicted both planning and behavior. In addition, an interaction between normative support and self-efficacy emerged. Parents with high self-efficacy engaged in high levels of planning, independent of normative support. Low self-efficacy with low normative support resulted in the lowest amount of planning; however, in the absence of normative support a high level of self-efficacy could compensate for it. Current findings provide avenues for future research to develop interventions to test the efficacy of these mechanisms in promoting parents' ability to ensure preschool-aged children are active.

Key words: self-efficacy, normative support, planning, social cognitive theory, exercise, children

Introduction

The prevalence of poor health outcomes such as overweight and obesity has been identified across the world, with a projected increase from 4.2% in 1990 and 6.7% in 2010 to 9.1% in 2020, in children aged 2-5 years (de Onis, Blossner, & Borghi, 2010). Physical inactivity and sedentary behaviors may contribute to obesity (Wareham, van Sluijs, & Ekelund, 2005), with engagement in regular physical activity, as well as healthy eating habits, being widely recommended as important weight control measures to avoid overweight and obesity (WHO, 2012). The Department of Health (2014), Australia recently developed guidelines relating to physical activity behaviors, recommending preschool-aged children (2-5 years) should achieve a minimum of three hours of physical activity each day. However, Australia preschool-aged children are reported to spend little time being physically active, with reports indicating that only approximately 5% of 3-5 year olds meet these guidelines (Hinkley, Salmon, Okely, Crawford, & Hesketh, 2012). Studies have also found that many activities preschool-aged children engage in are, in fact, sedentary in nature and, thus, likely contributing to the low levels of physical activity and increasing prevalence of overweight and obesity in these children (Hodges, Smith, Tidwell, & Berry, 2013). The preschool years are foundational in the development of health behaviors, such as physical activity (Certain & Kahn, 2002; Pate, Baranowski, Dowda, & Trost, 1996). Given that physical activity-related behaviors have been shown to track across time (Biddle, Pearson, Ross, & Braithwaite, 2010; Trudeau, Laurencelle, & Shephard, 2004), intervening early in a child's life is key to ensuring adequate daily physical activity to reduce the risk of becoming overweight or obese.

As preschool-aged children have limited capacities for self-regulating their health behaviors, parental guidance is needed, which requires parents to have the motivation, skills, patience, and opportunities to do so (Hamilton, Spinks, White, Kavanagh, & Walsh, 2016; Hamilton, Thomson, & White, 2013). However, even if parents are motivated to ensure their

child engages in a healthy lifestyle, corresponding behaviors often do not materialize. This is because ensuring preschool-aged children are being regularly active requires a level of parental control and overcoming the barriers that may thwart future behavior (Hamilton, Hatzis, Kavanagh, & White, 2015; Hamilton et al., 2016). Such beliefs are formed from individuals' evaluations of whether behavioral performance will be difficult or easy and perceived power over resources, skills, and opportunities for the behavior (Ajzen, 1991). If parents perceive many barriers to behavioral performance (e.g., time, cost, inconvenience, access, fatigue) and, thus, believe engaging their child in regular physical activity is difficult, they may be less likely to make decisions in favor of behavioral performance despite, in principle, agreeing with the importance of their child being physically active (Hamilton et al., 2015).

It is well known that people who are motivated to change their behavior often do not behave according with their intentions (Gollwitzer & Sheeran, 2006). This is because individuals are faced with multiple impediments that derail their attempts to engage in intended behaviors including distractions, temptations, or competing 'bad' habits. If individuals are not equipped with the means to meet these obstacles, then motivation alone will not be sufficient to change people's behavior. This inconsistency between intention and behavior is often known as the intention-behavior gap (Sheeran, 2002). To overcome this limitation, self-regulatory processes are thought to operate in concert with motivational processes to ensure an intention is realized.

Planning has been identified as a key self-regulatory activity that impacts on the intention-behavior relationship (Gollwitzer, 1999; Schwarzer, 2008). Although the concept of planning dates back to the late 1940s (Lewin, 1947), research on implementation intentions (Gollwitzer, 1999) (i.e., very specific plans that induce participants to form if-then plans – *if it is 5pm and I'm at home, then I will kick a ball with my child for 30 minutes*) and action

planning (Sniehotta, Schwarzer, Scholz, & Schüz, 2005) (i.e., plans that specify the when, where, how, and how often an intended behavior is to be performed – after breakfast, in the backyard, I will kick a ball with my child, for 30 minutes) sparked a renewed interest in the concept. Plans specify the situational context in which one will enact to ensure that behavioral performance is achieved. Detailing the specific context and time for enacting a behavioral intention allows the individual to mentally link the intended behavior with a particular context for its enactment. Making plans connects the individual with good opportunities to act as the critical situation becomes highly accessible and, thus, easily identifiable when encountered later. This process, in turn, enables the behavior to be performed automatically without requiring the effort and attention of the individual (Orbell, Hodgkins, & Sheeran, 1997; Sheeran, Webb, & Gollwitzer, 2005). Plans, therefore, increase behavioral engagement through these enhanced cue accessibility and automaticity of action initiation mechanisms rather than through increases in people's motivation or intention (Orbell et al., 1997). Thus, in line with dual-phase models of health behavior (Schwarzer, 2008), planning is proposed to have a direct effect on behavior and the effects of motivational processes on behavior is thought to be mediated through planning.

Over the past decade there has been a surge in intervention studies to enhance planning. These planning interventions have been found to be effective across a range of health behaviors including healthy eating (Adriaanse, de Ridder, & de Wit, 2009; Zhou et al., 2015a), contraception use (Teng & Mak, 2011), hand hygiene (Zhou, Jiang, Knoll, & Schwarzer, 2015b), sun safety (Zhou, Zhang, Knoll, & Schwarzer, 2014), oral self-care (Zhou, Sun, Knoll, Hamilton, & Schwarzer, 2015c), and physical activity (Barz et al., 2016). It is suggested that the advantages of planning interventions include low cost and response burden (Hagger & Luszczynska, 2014). Given the often limited financial resources to develop interventions and that time pressures are commonly cited by parents as barriers to health

behavior engagement (Hamilton et al., 2015), understanding better the planning-behavior relationship seems useful and a timely area of investigation in this context.

Overall, evidence supports the effectiveness of planning on health behavior (Hagger & Luszczynska, 2014), including parents' behavior for their children's health (Hamilton, Bonham, Bishara, Kroon, & Schwarzer, 2017a; Hamilton, Kirkpatrick, Rebar, & Hagger, 2017b), with meta-analytic research showing a notable medium effect size for planning on health behaviors (Gollwitzer & Sheeran, 2006). However, it is also noted that considerable heterogeneity in the effects across studies exist (Hagger & Luszczynska, 2014), and that some studies have found no effects of planning interventions on behavior (Jackson et al., 2005; Rutter, Steadman, & Quine, 2006; Skår, Sniehotta, Molloy, Prestwich, & Araujo-Soares, 2011). The equivocal findings suggest that the role of planning on behavior is complex and not yet fully understood. Despite the recent plethora of literature examining the intention-planning-behavior relationship, there remains questions regarding the role of planning on behavior. Accordingly, it has been suggested that priority areas for future research is the identification of mediators and moderators of planning on health behaviors (Hagger & Luszczynska, 2014; Sniehotta, 2009). For example, behavioral barriers (such as lack of resources, e.g., money; and environmental constraints, e.g., access to parks) are known to influence engagement in health behaviors (Hamilton, Daniels, Murray, White, & Walsh, 2012a; Hamilton et al., 2012b; Symons Downs & Hausenblas, 2005). Thus, in the context of this study, it may be reasonable to expect that an association between behavioral barriers and behavior would be more pronounced among parents who made more plans to engage their child in physical activity. In other words, if parents had made a plan for engaging their child in physical activity then this would help to overcome any barriers that may arise. This is because having a plan may help to provide strategies to overcome those barriers that may thwart future behavior (Hamilton et al., 2015; Sniehotta et al., 2005).

In addition to planning and behavioral barriers, a number of psycho-social factors have also been identified consistently in the literature as influencing the decisions of parents for their children's health (Hamilton, Daniels, Murray, White, & Walsh, 2012a; Hamilton et al., 2013; Jones & Prinz, 2005; Spinks & Hamilton, 2015; Thomson, White, & Hamilton, 2012; Walsh, Hamilton, & White, Hyde, 2015), including normative support and parental self-efficacy. According to social cognition models such as the health action process approach (Schwarzer, 2008), behavioral barriers and planning are considered to have a more proximal effect on behavior whereas psycho-social antecedents, such as normative support (i.e., supportive attitudes and behaviors of other parents for engaging preschool-aged children in regular physical activity) and task self-efficacy (i.e., confidence in one's ability to ensure their preschool-aged children are active), are proposed to exert a more distal influence on precursors of behavior such as goals or intentions.

Normative support or group norms often refer to the explicit or implicit prescriptions regarding one's appropriate attitudes (e.g., parents believing that their preschool-aged children performing regular physical activity is a good thing) and behaviors (e.g., parents ensuring their preschool-aged children perform daily physical activity) as a member of a specific reference group (e.g., other mothers) in a specific context (White, Hogg, & Terry, 2002). Individuals are more likely to perform a given behavior when there is normative support from a relevant group than without ingroup support (Terry & Hogg, 1996). Accordingly, normative support influences behavioral performance as the individual, based on their observations of group members, seeks to act in a manner similar with their ingroup, therefore achieving categorization as a group member (Terry & Hogg, 1996; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Self-efficacy, on the other hand, is an individual's belief in his or her ability to perform a specific action (e.g., getting their child to go outside to kick a ball) required to attain a desired outcome (e.g., child kicking a ball). People with strong self-efficacy beliefs

set higher goals, invest more effort into the pursuit of their goals, and are more likely to try harder if barriers and setbacks emerge (Bandura, 1997). In regards to the current context, this means that parents with high self-efficacy will hold perceptions about being able to motivate and guide their preschool-aged children's physical activity on a daily basis.

Recent research has also identified an interactive effect of self-efficacy and social influences (such as social support and normative support) on health behavior (Hamilton & Hagger, 2017; Hamilton, Warner, Schwarzer, 2017c; Warner, Ziegelmann, Schüz, Wurm, & Schwarzer, 2011; Zhou, Gan, Hamilton, & Schwarzer, 2017). According to social cognitive theory (Bandura, 1997), various possible interactions of self-efficacy and social influences may emerge. On the one hand, they could strengthen one another – *a synergistic hypothesis*. This synergistic interaction was found for older adults who, when reporting to have high levels of both resources, were most active (Warner et al., 2011). On the other hand, they could compensate each other – *a compensation hypothesis*. This compensation interaction posits that both resources could make up for lacks in the respective other (Bandura, 1997; Dishman, Saunders, Motl, Dowda, & Pate, 2008). The question to be answered is whether both normative support and self-efficacy combined need to be present for parents' planning for their preschool-aged children's physical activity (Warner et al., 2011) (synergistic effect) or whether one single resource is sufficient which would reflect a compensatory effect of one for the other (Dishman et al., 2008).

The aim of the current study was to examine the role of behavioral barriers, normative support, and self-efficacy on parents' planning and behavior for their pre-school aged children's physical activity. In line with the theoretical propositions discussed above, it was hypothesised that planning (Hypothesis 1) and behavioral barriers (Hypothesis 2) would have a direct effect on parents' behavior, and that a moderating effect between these two factors would also emerge (Hypothesis 3). Further, it was hypothesised that self-efficacy (Hypothesis

4) and normative support (Hypothesis 5) would have a direct effect on planning. To test for a synergistic or compensatory effect of normative support and self-efficacy, it was initially expected that making plans for their child to be active would serve as a mediator between normative support and the behavioral outcome (Hypothesis 6). Although this relationship would normally focus on the mediation effect of self-efficacy, we focused on the role of normative support. This is because parents are intertwined within social networks, the family unit being one such network and, thus, social influences are especially salient for parents of preschool-aged children. Both quantitative (Hamilton et al., 2015; Hamilton & White, 2012) and qualitative (Hamilton & White, 2010) research has identified the potential importance of social contexts in shaping parental decisions for physical activity-related behaviors. We then tested the conditional effect that was expected when self-efficacy comes into the equation as a putative moderator of the normative support–planning relationship, as the effect of normative support on planning may depend on levels of self-efficacy (Hypothesis 7). Specifically, we tested the hypotheses that when normative support is low, high self-efficacy could compensate for it when it comes to making action plans (compensation effect); or, if a high outcome level (planning) can only be attained if both normative support and self-efficacy are high then this would reflect a synergistic effect.

Method

Participants

The sample comprised of 208 Australian parents; 139 (66.8%) mothers ($M_{age} = 36.43$ years; $SD = 5.04$) and 69 (33.2%) fathers ($M_{age} = 36.33$ years; $SD = 6.50$) who had at least one child aged between 2 and 5 years who usually resided in the same household as the parent. There were 39 (18.8%) one-child families, 129 (62%) had two children, and 40 (19.3%) had three or more children. When responding to questionnaire items, parents were instructed to consider the oldest child aged between 2 and 5 years; 98 (47.1%) girls ($M_{age} = 3.87$ years; SD

= 0.96) and 110 (52.9%) boys ($M_{age} = 3.87$ years; $SD = 1.02$). Parents were independent, with only one partner from each couple completing the questionnaire. Almost all parents were married ($n = 199$; 96%), many had a university degree qualification ($n = 139$; 67%), and just over half were employed full time ($n = 109$; 52%). Participants were recruited via three strategies: online (e.g., parenting websites), face-to-face (e.g., swim schools), and childcare centers (long day care, kindergarten). A prize draw to win one of three AUD150 supermarket gift cards was offered on completion of the study.

Procedure

The University Human Research Ethics Committee approved the study. The current study was part of a larger project investigating factors which influence parental decision making for their children's physical and sedentary-related activities. This paper specifically focused on understanding the role of psycho-social factors for physical activity. A prospective-correlational design with two waves of data collection, spaced one week apart, was adopted. The Time 1 main questionnaire was conducted either on-line or paper-based and assessed the psycho-social variables. The Time 2 behavior follow-up was conducted over the telephone and assessed the actions of parents toward their child's physical activity during the previous week.

Measures

Psychological constructs were measured on multi-item psychometric instruments developed using standardized guidelines and validated in previous studies and adapted for use with the target behavior in the current study. The target behavior of physical activity was defined according to guidelines developed by the Australian Government Department of Health (Department of Health, 2014) for children aged 2 to 5 years. In responding to each questionnaire item, parents were asked to consider the following guideline: "children aged 2-5 years should be physically active every day for at least 3 hours, spread throughout the day.

Physical activity for children (aged between 2 and 5 years of age) includes anything from short bursts of activity, from light (building or playing on the floor) through to vigorous (such as running or jumping) and can be spread throughout the day.”

Self-efficacy. Self-efficacy was measured by two items based on Schwarzer and Luszczynska (2016) and reflected the parent’s sense of confidence about being capable of controlling their child’s physical activity (e.g., “I am confident that I could ensure my child is physically active for at least 3 hours every day in the next week” and “It would be easy for me to me ensure my child is physically active for at least 3 hours every day in the next week”, scored *strongly disagree* [1] to *strongly agree* [7]). The two self-efficacy items were significantly correlated, $r = .73, p < .01$.

Normative support. Normative support was measured by four items developed by Terry and Hogg (1996) and assessed the attitude and behavior of other important referents in this context (e.g., “How many other parents you know with young children would ensure that their child is physically active for at least 3 hours every day?”, scored *none* [1] to *all* [7]). Cronbach’s alpha for the current study was .88.

Planning. Planning was measured by four items based on Sniehotta et al. (2005) and assessed the extent to which one has made a plan in relation to “When...”, “Where...”, “How...”, and “How often...” “...to engage my child in at least 3 hours of physical activity every day over the next week”, scored *not at all true* [1] to *exactly true* [7]). Cronbach’s alpha for the current study was .95.

Behavioral barriers. Behavioral barriers was measured with 11 items, derived from a prior qualitative study (Hamilton et al., 2015), that asked participants how likely the following factors would prevent them from ensuring their child is physically active for at least 3 hours every day in the next week namely: “lack of time”, “parent tiredness”, “inconvenience”, “lack of support”, “lack of access to resources/parks”, “poor weather”, “cost”, “inactive natured

child", "child illness/injury", "parent illness/injury", and "parent fatigue", scored on a 7-point Likert scale [1] *extremely unlikely* to [7] *extremely likely*. Cronbach's alpha for the current study was .87.

Reported behavior. One week later, parents reported their behavior for their child in the previous week using two items (Hamilton et al., 2013): "In the past week, to what extent did you ensure your child was physically active for at least 3 hours each day?" and "How often, in the last week, did you ensure that your child was physically active for at least 3 hours every day", scored [1] *not at all* to [7] *a large extent*. The two behavior items were significantly correlated, $r = .95, p < .001$.

Data Analyses

Computations were performed with SPSS 23 as well as with the Process macro by Hayes (Hayes, 2013). First, a simple mediation model was carried out. Planning as a putative mediator was regressed on normative support whereas the dependent variable (child's physical activity) was regressed on the independent variable normative support, on the putative mediator planning. Second, once the simple mediation was corroborated, two putative moderators were added to the model. For this purpose, a conditional process analysis was conducted that integrates mediation and moderation analyses (Hayes, 2013). Thus, planning was regressed on normative support and self-efficacy as well as on the interaction term of these two predictors; and physical activity was regressed on planning, behavioral barriers, and their interaction term. Confidence intervals (95%) were generated by bootstrapping with 5000 re-samples.

Results

Means, standard deviations, and correlations are shown in Table 1. Parents in the current study ensured that their child was physically active for at least 3 hours each day to a moderate

degree, with a mean score 5.55 ($SD=1.42$, range 1-7). As displayed in Table 1, self-efficacy was the strongest correlate to behavior.

[Insert Table 1 about here]

One week after baseline, 56 parents (26.9%) did not complete the outcome variable on physical activity. Missing values for the other variables ranged between 1% and 1.9%. To examine attrition bias, a multivariate analysis of variance was computed with all study variables as dependent variables and a drop-out code as fixed factor. The only significant differences ($p < .05$) between remaining parents and those who dropped out were for age (remaining $M_{age} = 36$ years, dropped out $M_{age} = 38$ years) and normative support (remaining $M = 4.74$, dropped out $M = 5.24$). To avoid listwise deletion due to only one study variable, missing follow-up activity scores were imputed with the expectation maximization method (EM). To check for bias, we used Little's MCAR test yielding Chi-Square = 116.106 ($df = 100$), $p = .13$. The null hypothesis is that the data are missing completely at random (MCAR), no patterns exists in the missing data. A large p-value ($p > .05$) indicates weak evidence against the null hypothesis, so one fails to reject the null hypothesis, as in this case, which means imputation does not lead to bias. There were only negligible differences in parameter estimates when making all further computations either with or without the imputed scores.

Testing the simple mediation hypothesis for the relationship from normative support to physical activity via planning yielded an indirect effect of 0.09, CI 95% [0.05, 0.16]. The ratio of indirect to total effect was 0.24, CI 95% [0.12, 0.46]. This provides evidence for the assumption of a simple mediation and allowed proceeding to the conditional process analysis. Figure 1 displays the conditional process model with unstandardized parameter estimates, in which moderated mediation takes place with two moderators, as reflected by the interaction term of self-efficacy and normative support on planning, as well as by the other interaction term between planning and behavioral barriers on physical activity. In detail, the following

unstandardized parameters were estimated. The effect of self-efficacy on planning was $b = 0.15$, CI 95% [0.00, 0.31], the effect of normative support on planning was $b = 0.31$, CI 95% [0.08, 0.54], and their interaction was $b = -0.12$, CI 95% [-0.23, -0.01]. Of the planning variance, 14% were accounted for by this set of predictors. On the right side of the model, the effect of planning on physical activity was $b = 0.21$, CI 95% [0.10, 0.33], the direct effect of normative support on physical activity was $b = 0.33$, CI 95% [0.13, 0.53], the effect of behavioral barriers on physical activity was $b = -0.22$, CI 95% [-0.36, -0.08], and the interaction between behavioral barriers and planning was $b = 0.10$, CI 95% [0.02, 0.18]. The results remained unchanged controlling for age and sex.

[Insert Figure 1 about here]

To illustrate the first interaction on the left side of the model, the regression lines were plotted using three levels of the moderator self-efficacy ($-1 SD$, M , $+1 SD$). Figure 2 illustrates that at high levels of self-efficacy, there is also a high level of planning, independent on levels of normative support. However, in the presence of low self-efficacy in conjunction with low normative support, the lowest amount of planning was reported. Moreover, when parents are not guided by normative support, then a high level of self-efficacy could compensate for it.

[Insert Figure 2 about here]

To illustrate the second interaction on the right side of the model, the regression lines were plotted using three levels of the moderator behavioral barriers ($-1 SD$, M , $+1 SD$). Perceiving barriers makes parents less inclined to be engaged for their child's physical activity. However, this also depends on their planning. Figure 3 illustrates that at high levels of behavioral barriers, parents do not engage; however, if they are involved in more planning, then this helps them to compensate for barriers. On the other hand, if they do not perceive many behavioral barriers then there is no need to invest in planning to become engaged in their child's physical activity.

[Insert Figure 3 about here]

Discussion

Lack of physical activity is one of the most serious public health challenges of the 21st century (WHO, 2012). Given preschool-aged children have limited capacities for self-regulating their health behaviors, such as regular physical activity, parental guidance is needed. Considering the equivocal evidence supporting physical activity interventions in preschool-aged children, future programs that are developed need to be grounded in theory and include a parental component. Planning interventions are suggested to be low in cost and response burden (Hagger & Luszczynska, 2014). Such designs would therefore be appropriate for parents of preschool-aged children who often cite time pressures as barriers to health behavior engagement. Currently, the planning-behavior relationship is not yet fully understood and research identifying the mediators and moderators of planning on health behavior is a priority.

In relation to the hypotheses examining the more proximal predictors on behavior, results showed direct effects of both planning (supporting Hypothesis 1) and behavioral barriers (supporting Hypothesis 2) on behavior, which is in line with dual-phase models of health behavior such as the HAPA (Schwarzer, 2008) and previous research examining parental decisions for childhood health (Hamilton et al., 2012b; Hamilton et al., 2015; Spinks & Hamilton, 2015). Moreover, there was an interaction, demonstrating that the strength of relationship between behavioral barriers and behavior depended on the level of planning (supporting Hypothesis 3). Specifically, if parents believe there to be many barriers to engaging their child in physical activity and, at the same time, they refrain from planning, then they will be less likely to ensure their children are physically active. However, if parents invest energy into making plans for their pre-school aged children to be active, then this helps

to compensate against those behavioral barriers. If none or only limited behavioral barriers are perceived, then planning is not necessary.

Current findings provide suggestions for future research aimed at facilitating physical activity in pre-school aged children. First, it may be useful to explore the use of simple action plans in promoting parents engage their pre-school aged children in adequate physical activity. Research has shown that effective plans are those that specify when, where, and how to act on intended goals by using an IF-THEN format, also known as an 'implementation intention' (Gollwitzer, 1999). The IF part of the plan identifies the critical situation that usually triggers the behavior (e.g., IF it is after breakfast on the weekend); the THEN part specifies the action (e.g., THEN I will take my child to the park for 1 hour). It could also be useful to include mental contrasting with planning (e.g., Adriaanse et al., 2010; Sheeran, Harris, Vaughan, Oettingen, & Gollwitzer, 2013) using open-source self-administered applications such as WOOP (Wish, Outcome, Obstacle, Plan; <http://woopmylife.org/woop-1/>). Second, given the equivocal findings in support of planning interventions (Hagger & Luszczynska, 2014; Sniehotta, 2009), it may be the case that such interventions to be efficacious need to be designed for those who perceive many behavioral barriers to action. Indeed, developing coping plans to overcome barriers has been suggested to help people translate their intentions into action (Sniehotta et al., 2005), including among parents of preschool-aged children (Hamilton, Cox, & White, 2012c).

In relation to the hypotheses examining the more distal predictors on behavior, results showed evidence of a simple mediation between normative support and behavior by planning (supporting Hypothesis 6); however, a direct effect of normative support on behavior was also observed (supporting Hypothesis 4). Further, there was a direct effect of planning on behavior (supporting Hypothesis 5) and also an interaction (supporting Hypothesis 7), demonstrating that the strength of relationship between normative support and planning depended on how

self-efficacious parents believe themselves to be in engaging their child in physical activity. If parents have high levels of self-efficacy, they also engage in a high level of planning, independent on levels of normative support. Lack of self-efficacy, however, is a real disadvantage on parental planning if there is also a lack of normative support; although, in the absence of normative support, a high level of self-efficacy could compensate for it. Independent of levels of normative support there was a high level of planning, if self-efficacy was high.

The interaction between these two factors that emerged in the current study supports previous research which showed parental self-efficacy and social support to be positively interrelated (Young, 2011), and other studies that have examined the relationship between self-efficacy and social support for physical activity (Dishman et al., 2008; Hamilton, Warner, & Schwarzer, 2016; Warner et al., 2011). Specifically, the current findings provide evidence for a compensatory effect (Dishman et al., 2008; Warner et al., 2011) rather than synergistic effect (Dishman et al., 2008; Warner et al., 2011) between normative support and self-efficacy for parents' planning. This is because a high level of planning occurred if self-efficacy was high regardless of normative support; and at low levels of normative support, high self-efficacy was able to buffer this lack of support (compensation effect). Again, these findings are significant and provide evidence for the role of normative support and self-efficacy on making plans for actioning health behavior. Normative influences and self-efficacy are particularly salient for parental decision making (Hamilton et al., 2015; Hamilton et al., 2013; Hamilton & White, 2010). Thus, it may be important for researchers designing parental-child planning interventions to first identify individuals who are low self-efficacious and receive less normative support and improve both of these two coping resources before implementing the planning intervention on such individuals.

Limitations and Future Research Directions

Some conceptual and methodological limitations of the current study need to be mentioned to evaluate these results and their implications for future research. Given the main focus of this paper was to investigate the interplay of psycho-social antecedents for preschool-aged children's activity levels, the behavior measure only assessed self-reported physical activity over a one-week time period and from parents' perspective. Although self-reports are a frequently utilized practice in research on physical activity, and the validity of such measures has been shown to be satisfactory (Hamilton, White, & Cuddihy, 2012d; Prince et al., 2008), to support the current preliminary findings and to investigate changes in naturally occurring physical activity over time, baseline measures of behavior as well as longer follow-ups and objective and subjective measures of the preschool-aged children would be advisable. Such methods may provide more accurate recordings of child physical activity that is not biased by potential social desirability factors and assumptions made by parents of activity performed by the child while in others' care. It may also avoid the likelihood of the effects on behavior being governed by the individual's cognitive decision making processes that strive for consistency in their beliefs.

A further limitation to consider was that the sample comprised of mostly Caucasians and educated individuals living in partnered relationships, thus limiting generalisability of data across different cultural and socio-economic groups. Previous research has highlighted the importance of differing beliefs about physical activity among diverse demographic and cultural groups (Eyler et al., 2002). Future research should continue to explore if such disparities as well as similarities exist, especially given that in Australia ethnic minority and low-income populations have the highest rates of poor health (AIHW, 2016). In addition, the focus of this study was on physical activity. However, nutrition behaviors also play a role on weight management (WHO, 2012), the development of healthful habits (Mullan et al., 2016),

and parents' decisions for their preschool-aged children (Spinks & Hamilton, 2015), and thus, needs future attention.

In conclusion, many Australian preschool-aged children do not engage in physical activity at recommended levels (Hinkley et al., 2012). Parents are key providers and have considerable control over their child's health during the younger years, and parental planning is important to engaging preschool-aged children in physical activity. In the current study, normative support and self-efficacy were identified as key factors that influence the planning process. Current findings also shed some light on the interplay between these two factors as well as the influence of behavioral barriers on the planning-behavior relationship. Through the identification of the psycho-social antecedents influencing parents' planning and behavior, interventions can target behavioral barriers, normative support, and self-efficacy to test the efficacy of these mechanisms in increasing parents' ability to ensure preschool-aged children are physically active at recommended levels.

Acknowledgments

The authors declare that they have no conflict of interest. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The Griffith University Human Research Ethics Committee approved the study. Informed consent was obtained from all individual participants in the study.

Author Contributions

KH designed and executed the study, assisted with data analyses, and wrote the paper. RS analyzed the data, wrote the results section, and collaborated in the writing and editing of the final manuscript.

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1 *Table 1. Descriptive Analysis for the Target Variables in the Current Study: Bivariate Correlations, Means, and Standard Deviations*

	<i>M</i>	<i>SD</i>	2.	3.	4.	5.	6.	7
1. Sex (139 women, 69 men)			.01	.08	.05	.05	-.03	.16*
2. Parents' Age (years)	36.40	5.56	-	.00	.00	.10	.10	.08
3. Self-efficacy (scale 1-7)	4.91	1.67		-	.26**	.35**	-.32**	.52**
4. Planning (scale 1-7)	4.25	1.53			-	.31**	-.28**	.38**
5. Normative support (scale 1-7)	5.26	1.31				-	-.21**	.39**
6. Behavioral Barriers (scale 1-7)	3.02	1.14						-.31**
7. Physical Activity (1-7)	5.55	1.42					-	

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3 *Note.* * $p < .05$; ** $p < .01$; Sex: women=1, men=0

4 *Figure 1: Conditional process model: Parental planning mediates between normative support*
 5 *and self-reported parental behavior, while parental self-efficacy and behavioral barriers*
 6 *moderate this process*

7 Note: Path coefficients are unstandardized parameter estimates; * $p < .05$, ** $p < .01$

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15 *Figure 2: Interaction between parental self-efficacy and normative support on parental*
 16 *planning of their child's physical activity*

22 *Figure 3: Interaction between parental planning and behavioral barriers on parents' behavior*
 23 *for their child's physical activity*