

QUT Digital Repository:
<http://eprints.qut.edu.au/>



This is the author's version published as:

Hamilton, Kyra and White, Katherine M. (2010) *Identifying key belief-based targets for promoting regular physical activity among mothers and fathers with young children.* Journal of Science and Medicine in Sport.

© 2010 Sports Medicine Australia. Published by Elsevier Ltd.
All rights reserved.

Running head: key parental physical activity beliefs

Identifying key belief-based targets for promoting regular physical activity among mothers and fathers with young children

Abstract

We investigated the key beliefs to target in interventions aimed at increasing physical activity (PA) among mothers and fathers of young children. Parents (288 mothers, 292 fathers) completed a Theory of Planned Behaviour belief-based questionnaire and a 1-week follow-up of PA behaviour. We found that a range of behavioural, normative, and control beliefs were significantly correlated with parents' PA intentions and behaviour, with only a few differences observed in correlations between PA beliefs and intention and behaviour by gender. A range of key beliefs was identified as making independent contributions to parents' PA intentions; however, the behavioural beliefs about improving parenting practices ($\beta = 0.13$), interfering with other commitments ($\beta = -0.29$); normative beliefs about people I exercise with ($\beta = 0.20$); and control beliefs about lack of time ($\beta = -0.24$), inconvenience ($\beta = -0.14$), lack of motivation ($\beta = -0.34$), were revealed as significant independent predictors of actual PA behaviour. Furthermore, we found that a limited amount of parents already hold these beliefs, suggesting that these key beliefs warrant changing and, therefore, are appropriate targets for subsequent intervention. The current study fills an empirical gap in the PA literature by investigating an at-risk group and using a well established theoretical framework to identify key beliefs that guide parents' PA decision-making. Overall, we found support for parents being a unique group who hold distinctive behavioural, normative, and control beliefs toward PA. Attention to these key underlying beliefs will assist intervention work aimed at combating inactivity among this at-risk population.

Keywords: parenthood; exercise behaviour; physical activity; theory of planned behaviour; beliefs, belief-based targets

Introduction

Lack of physical activity (PA) at levels to gain health benefits is of concern both nationally [1,2] and internationally [3]. Of greater concern is that specific groups within broader populations are more at risk for inactivity, including parents with young children [4]. Despite parents' risk for inactivity, little is known about the mechanisms that guide parental PA decision-making; thus, there is currently scant evidence to base interventions for increasing PA among this specific at-risk group, which is important given that tailored interventions are most effective [5].

The Theory of Planned Behaviour (TPB; [6]) is a useful framework that can help to identify key targets for tailored interventions and is a well validated decision-making model in the PA domain (see [7]). The TPB suggests that the proximal determinant of behaviour is intention to engage in that behaviour. Intentions, in turn, are determined from three constructs: attitudes (overall evaluations of the behaviour), subjective norms (perceived social pressure to perform the behaviour from important referents), and perceived behavioural control (perceived control over performing the behaviour; also believed to influence behaviour directly) [6]. An important feature of the TPB is its suggestion that the antecedents of attitude, subjective norms, and perceived behavioural control are corresponding behavioural (costs and benefits), normative (pressure to comply with important others' approval or disapproval), and control beliefs (motivating or inhibiting factors), respectively, that reflect the underlying cognitive structure that determines an individual's intentions and subsequent behaviour [6]. These underlying expectancy beliefs are further thought to interact with the value one places on their beliefs. The explanatory power of beliefs in informing people's intentions and behaviour is based on salient beliefs or those beliefs readily accessible in memory [6]. This proposition is supported by the work of Van de Pligt and colleagues [8,9] who suggest that belief salience can help improve our insights into attitude formation and that people tend to use only a small number of most important beliefs to inform their attitudes toward a given behaviour.

A number of studies have used the TPB framework to elicit beliefs for exercise behaviour (see [10]). Specifically, it has been found that the most salient advantage of PA is that it improves physical and psychological health and the most common disadvantage is pain and injury. Family, friends, and healthcare professionals are reported as salient normative influences, with health issues

(e.g., illness) and inconvenience (e.g., lack of access to facilities) reported as the most frequent inhibitors to activity performance [10]. Furthermore, the belief basis of the TPB has been used successfully to understand PA-related behaviour within general adult populations [11], but also within more defined adult groups including older adult [12] and clinical populations [13,14] in which the belief-based components of the TPB have significantly predicted PA behaviour explaining between 12% and 24% of the variance [12,13]. In the case of behaviour, in general, control ($\beta = .17$ to $.36$) and behavioural beliefs ($\beta = .15$ to $.28$), specifically beliefs about time, health, and lack of commitment [11,12], have revealed significant associations with PA whereas normative beliefs have revealed lower associations ($\beta = .06$ to $.17$) [11-13]. For intentions, however, normative beliefs have revealed strong associations with people's PA intentions ($\beta = .31$ to $.40$), specifically beliefs in relation to family, friend, and physician approval [11]. Control beliefs ($\beta = .11$ to $.29$) and behavioural beliefs ($\beta = .14$ to $.51$) [12,14] have also revealed significant associations with PA intentions with specific beliefs about time and physical and mental health emerging as independent predictors in general adult populations [11]. No previous study, however, has tried to demonstrate the key beliefs underlying parents' PA, specifically the PA beliefs underlying mothers and fathers with young children.

During the years of establishing a young family, parents are often faced with additional constraints (e.g., time constraints and set routines due to fulfilling childcare needs) that may influence their interest and ability to be involved in regular PA. Many external influences (e.g., access to facilities that offer integrative and flexible child/parent programs) can also serve to facilitate or hinder this interest. The everyday challenges of parents, therefore, may alter their beliefs about PA engagement and, thus, the beliefs of parents may differ from those of the general adult population. Ajzen and Fishbein [15] suggest that belief elicitation should occur for each new behaviour or target population being investigated as the reasons that underlie why people hold certain attitudes and perceptions of social pressure and behavioural control may differ according to the specific behaviour or population being targeted. Taking this targeted approach to identifying the beliefs of parents is important given that in Australia over 1 million families have at least one child aged under 5 years [16].

Using the TPB as a theoretical framework, we aimed to investigate key beliefs that underlie parents' decision-making toward regular PA participation. Given that it is suggested that the traditional value items of the TPB have a limited additional utility for belief measurement [17], we focused only on the behavioural, normative, and control expectancy beliefs underlying parents' perceptions about regular PA. First, we expected that significant correlations between the PA behavioural, normative, and control beliefs and intention and behaviour will be observed. Second, given that it is suggested that beliefs may differ for different populations [15], in an exploratory manner, we examined if gender differences in beliefs exist. Third, we expected that some of the significant key beliefs will independently predict parents' PA intentions and behaviour. However, given that it is suggested that belief-behaviour relations are fundamental to providing preliminary evidence to support the usefulness of targeting a belief in a behavioural intervention (see [18,19]), we placed a critical focus on identifying those beliefs that predict parental PA behaviour. Finally, in an exploratory manner, we examined the relative amount of parents who fully and strongly accept each of these key beliefs to determine the usefulness of the belief for subsequent intervention strategies.

Methods

The research was carried out between September 2009 and January 2010 and ethical clearance was granted. Participants were 580 parents ($n = 288$ mothers, $n = 292$ fathers) living in Australia, but predominately in Queensland (89%) with at least one child under 5 years of age. Individuals who were pregnant and/or had a medical condition that prevents performing PA at the recommended levels were excluded from participation. See the Supplementary Table for a description of the parents in this study. Parents were recruited via various family and parenting networks including mothers' and fathers' groups, baby/toddler swim schools, and child play centres as well as through the local Playgroup Association, one prominent day care association, two online parenting forums in Australia, and the University Alumni association.

Parents completed a Theory of Planned Behaviour belief-based questionnaire, either on-line ($n = 313$) or paper-based ($n = 267$). Examination of the correlations of the PA beliefs across the methods of questionnaire delivery revealed no significant differences. One week later, via telephone follow-up for those parents who consented to be re-contacted, parents self-reported their PA

behaviour in the previous week. The target behaviour was regular PA and was defined according to current guidelines (i.e., PA performed of at least a moderate-intensity on 5 days or more of the week for at least 30 minutes) (see [20,21]). A prior qualitative study, using guidelines as outlined by Fishbein and Ajzen [15], was conducted with 40 parents to elicit salient beliefs to assess the behavioural, normative, and control belief-based measures in this study (for details see [22]). Specifically, individual and group interviews were used to identify the most commonly occurring behavioural, normative, and control beliefs. To elicit salient beliefs, the interview guide comprised of open-ended questions [15] in which parents were asked to report the advantages and disadvantages of engaging in regular PA, the individuals or groups of people who would approve or disapprove of regular PA performance, and any factors that make it easy or difficult to perform regular PA. Using thematic content analysis, a number of beliefs were elicited. All seven normative beliefs were retained for the current belief-evaluation quantitative study. Given that a larger number of behavioural and control beliefs were elicited and that people use only a small number of most important beliefs to inform their decision-making [9], we chose beliefs that exceeded a 30% frequency cutoff to assess the behavioural and control belief-based measures in the quantitative study.

To assess behavioural beliefs, parents rated how likely two costs (e.g., interfere with my other commitments) and five benefits (e.g., improve my parenting practices) would result if they performed PA. For normative beliefs, participants rated how likely seven referents (e.g., partner/spouse) would think they should engage in PA. Control beliefs were assessed by asking parents to rate how likely it was that six barriers (e.g., lack of time) would prevent them from performing PA. All belief-based items were scored on 7-point Likert scales, scored *extremely unlikely* (1) to *extremely likely* (7). For a full listing of belief-based items, see Table 1. The outcome measure of intention was measured on a three item scale (e.g., “I intend to do regular PA in the next week”, scored *strongly disagree* [1] to *strongly agree* [7]) and was reliable ($\alpha = .95$). The outcome measure of behaviour was measured on a single-item scale assessing the number of days parents had performed PA in the intervening week, (i.e., “On how many days in the course of the past week (past 7 days) have you engaged in at least 30 minutes of at least a moderate-intensity PA”). To maximise congruence between the measures, both

prediction and criterion variables were measured at the same level of specificity in terms of action, target, and time and were constructed in line with TPB recommendations [6].

Although some debate over analysis of TPB beliefs exist in that belief-behaviour associations are suggested for investigation (see [18,19]), Fishbein et al. [23] recommends that analyses focused on belief-intention relations are appropriate. Given this debate, within each belief-based measure, individual beliefs were evaluated with its relationship to PA intentions and behaviour, but we considered PA behaviour the critical target. For belief-based analysis, the principles of Hornik and Woolf [24] were applied to identify key beliefs to target for resultant intervention. These principles state that 1) key beliefs should be strongly related to and independently influence the intention or behaviour under investigation, 2) there should be a relative amount of individuals who do not already hold the belief, and 3) it should be possible to change the belief. Unlike the first two principles which are empirically driven, the latter principle is often based on more subjective interpretations, although empirically driven arguments to support the belief change are preferable [23]. First, we examined the underlying beliefs to identify which beliefs significantly correlated with intention and behaviour. Given that it is suggested that beliefs may differ for different populations [6], we examined also if gender differences in beliefs existed using Fisher Z tests. To identify those beliefs that make independent contributions to intention and behaviour, within each belief-based measure, the significant key beliefs were entered into a multiple regression analysis. As a final step, all of the significant beliefs within a belief-based measure that independently predicted parental regular PA were examined to determine the percentage of parents who fully and strongly accept the belief.

Results

Means and standard deviations for the PA beliefs, intention, and behaviour are presented in Table 1. As shown in Table 1, parents generally had moderate intentions to perform regular PA in the next week ($M = 5.38$, $SD = 1.75$) with an average of at least 30 minutes of at least a moderate-intensity PA being performed on 3 days. Correlations for PA beliefs with intention and behaviour for the total sample and for mothers and fathers are presented in Table 1. As demonstrated in this table, for the total sample of parents, all of the beliefs significantly correlated with intention with the exception of behavioural beliefs about opportunity to socialise and sustaining pain/injury. For belief-

behaviour relations, for the total sample of parents, all of the control and normative beliefs (with the exception of normative beliefs about healthcare professionals) significantly correlated with behaviour, but only behavioural beliefs about opportunity to socialise, improve parenting practices, and interfere with commitments were found to be significantly related to PA behaviour. Evaluation of the correlations between PA beliefs and intention and behaviour by gender suggested that 3 out of the 20 correlations were significantly different. The behavioural belief that regular PA would lead to weight loss had a higher correlation with mothers' intentions and behaviour than for fathers. However, although the r coefficient suggests that this belief is significantly more related to mothers' than fathers' regular PA intentions, for behaviour, the r coefficient suggests that this belief is not significantly related to either mothers' or fathers' regular PA performance. By contrast, the normative belief that spouse/partners would approve of regular PA performance had a higher correlation with intention for mothers than fathers, while the control belief that illness/injury would prevent regular PA had a greater relationship with behaviour for fathers than mothers.

Given that only minimal differences between PA beliefs and intention and behaviour by gender were observed, we regressed the significant key beliefs on intention and behaviour for the total sample of parents. As demonstrated in Table 2, behavioural beliefs about improving mental well-being, improving parenting practices, interfering with other commitments (but not the belief about improving physical health); normative beliefs about people I exercise with, spouse/partner (but not the beliefs about children, other family members, friends, healthcare professionals); and control beliefs about lack of time, inconvenience, lack of motivation, illness and injury (but not the beliefs about tiredness, cost), were revealed as independent predictors of intention. For our critical target of belief-behaviour relations, behavioural beliefs about improving parenting practices, interfering with other commitments; normative beliefs about people I exercise with; and control beliefs about lack of time, inconvenience, lack of motivation were revealed as significant independent predictors of actual PA behaviour. Finally, for each of the beliefs that made an independent contribution to parents' regular PA, there were a large percentage of parents who did not already fully or strongly accept each of these key beliefs (see Table 2).

Discussion

We aimed to identify, using a TPB approach, the key belief-based targets for tailoring an intervention aimed at promoting regular PA among parents with young children. We found that a range of behavioural, normative, and control beliefs significantly correlated with parents' PA, with only a few differences observed in correlations between the PA beliefs and intention and behaviour by gender. A range of key beliefs was identified as making an independent contribution to parents' PA intentions; however, the behavioural beliefs about improving parenting practices, interfering with other commitments; normative beliefs about people I exercise with; and control beliefs about lack of time, inconvenience, lack of motivation, were revealed as significant independent predictors of actual PA behaviour. Furthermore, we found that a limited amount of parents already hold these beliefs suggesting that these key beliefs warrant trying to change them and, therefore, are appropriate targets for subsequent intervention. The current study fills an empirical gap in the PA literature by investigating an at-risk group and using a well established theoretical framework to identify the key beliefs that guide parents' PA decision-making which resultant intervention work can target to combat parental inactivity.

The findings help us to understand the relationship between beliefs and parental PA. First, and consistent with previous TPB belief-based research in the PA domain [11-14], a range of behavioural beliefs was significantly correlated with parents' PA intentions and behaviour, suggesting that programs for promoting parental PA should focus on increasing positive attitudes. However, unlike previous research which has identified health benefits and time issues as the major advantages and disadvantages to PA performance in general adult populations [11], we found that improvements to parenting practices and interferences to other commitments as the key behavioural beliefs underlying parents' PA decision-making. These findings suggest that parents focus on their parenting role and commitments when deciding whether or not to engage in regular PA and support the proposition that parents are a unique group who hold distinctive attitudinal beliefs. Furthermore, changing these beliefs are possible given that previous research suggests that PA participation can have positive effects on parenting practices [25] and does not necessarily need to interfere with parenting commitments [25,26]. Concurring with previous research [12,14], however, improving mental well-being and controlling weight loss (especially for mothers) were identified as important to

intention formation, although it should be noted that that the majority of parents already hold these beliefs and, thus, may not be effective strategies for challenging parents' PA intentions.

Our findings suggest also that normative beliefs are associated with parental PA, in particular, the belief about people who parents exercise with. Thus, unlike previous research which has identified social pressures from family, friends, and healthcare professionals as important to PA participation in general adult populations [11], we found that the approval of active others is important in informing mothers' and fathers' PA decision-making (although we did find that partner approval is important in establishing intentions, especially for mothers). Previous qualitative research has identified that being surrounded by other people who exercise, especially active parents of young children, may help to reduce the guilt associated with parental PA performance [22]. This guilt arises because parents are often competing against the demands of their parenting responsibilities with their need to engage in health promoting behaviours, such as PA [26,27]. Therefore, the approval from those people who parents are active with may help to reduce this guilt by fostering PA as being a normative behaviour in this context and, thus, is not about taking time away from childcare responsibilities but rather is about performing a behaviour as part of everyday life. This finding further highlights the unique perspective of parents in relation to PA with the empirical literature suggesting also that this normative belief may be amenable to change through its impact on reducing parental guilt.

Finally, inspection of the control beliefs revealed those parental PA beliefs about lack of motivation, inconvenience, and lack of time were significant independent predictors of PA behaviour and concurs with previous TPB belief-based research in the PA domain [11-14]. Interestingly, however, is that where time issues are identified as the most important control belief preventing activity performance in general adult populations [11], for parents, lack of motivation is the most important inhibitor. It is likely that the demands of parenting can often leave parents feeling exhausted and, thus, may lead to a lack of energy and motivation to engage in regular PA. It is reasonable, then, that in addition to considering time constraints and inconvenience factors as inhibiting regular parental PA, motivation is also important to consider in this context. Given that it is suggested that parenthood does not make engaging in PA impossible but rather can create opportunities to be active [26] and that regular PA can enhance energy levels to combat lack of energy and motivation [28],

challenging these beliefs with the aim of changing them to increase parental PA is possible.

Furthermore, given the suggestion that current PA recommendations can be met if one spends just one fifth of 'sitting' leisure time engaged in moderate activity [29], challenging the belief about time may also be possible. It should be further noted that, although not a predictor of behaviour, illness/injury was identified as important for intentions; however, the direction of effect was positive. This finding suggests that those parents who perceive illness/injury as preventing activity performance are more likely to intend to perform PA. Although this finding might be contrary to expectations, it could suggest that those individuals who perceive injury/illness as preventing PA performance are also more likely to intend to engage in some type of activity for rehabilitation purposes; however, given the lack of prediction on behaviour, it might further suggest that this control belief is not necessarily important for actual PA performance.

It is suggested that, to design effective TPB-based interventions, beliefs should first be elicited from the target population as the beliefs underlying people's decision-making may differ according to the specific behaviour or population being targeted [6]. Thus, although our findings are broadly consistent with previous TPB belief-based studies in the PA domain where a range of behavioural, normative, control beliefs have been found to predict people's PA [11-14] and, more recently, with research investigating correlates of mothers' PA [30], we also found support for a range of beliefs unique to this population group. These key beliefs that are distinctive to parents with young children should be considered when designing interventions aimed at improving parental PA and supports the notion that there are specific beliefs that guide PA decision-making for different population groups. Specifically, these should highlight that regular PA improves parenting practices. For example, health messages could portray parents as being in a relaxed mood and more tolerant with their children after going for a brisk walk. Additionally, interventions should promote that interfering with other commitments is not a necessary outcome of regular PA, such as providing parents with suggestions of how they can obtain required levels of PA that fit within their daily routines (e.g., engaging in more moderately active play with their children, going for 10 minute brisk walks around their work place). In addition, recruiting the approval of the individuals who parents are likely to be active with may help to establish regular PA in parents with young children as a behaviour

that is socially approved of and, thus, help to lessen any guilt toward engaging in the behaviour.

Finally, results of the control beliefs suggest that key targets for resultant intervention should focus on helping parents to find ways to increase their motivation for PA and identify solutions to the inconvenience factors that make regular PA difficult to achieve. Additionally, it might be useful for health promoters to focus on helping parents identify times when they can be active. Such strategies may help parents overcome barriers that prevent PA performance, in turn, helping them to achieve more personal control over their PA behaviour.

While the research has a number of strengths including the examination of an at-risk group for physical inactivity, having a sample that was representative of both sexes, and using a well established theoretical approach to identify key PA beliefs, the current study also has a number of limitations. First, we used self-report data which might facilitate socially desirable responses. Second, the sample was predominately Caucasian; thus, the findings may not generalise to mothers and fathers from other ethnic backgrounds. Finally, this study provides the basis for the variables to target in resultant intervention work and future research should test the efficacy of interventions targeting these identified beliefs in actually changing mothers' and fathers' intentions, and subsequent behaviour, in relation to regular PA performance.

Conclusion

This study, via adopting a TPB belief-based approach, provides important applied information that can be used to inform intervention programs aimed at increasing parental PA. Our findings are broadly consistent with previous TPB belief-based PA studies in general adult populations; however, we also found support for a range of beliefs unique to this population group (e.g., improving parenting practices) as well as a few beliefs unique to each gender (e.g., spouse/partner approval and attitudinal beliefs about weight loss being more influential for mothers' behavioural intentions). These findings highlight the importance of tailoring intervention strategies for parents of young children and that it might also be useful to tailor a few messages specific to the sexes. Overall, the findings suggest that attention to increasing positive attitudes, considering the social approval of active others, and addressing the barriers to PA engagement in understanding parental PA decision-making may assist in

improving mothers' and fathers' performance of regular PA, therefore maximising the benefits to parents' health and well-being.

Practical implications

- To improve parental PA, health messages could portray parents as being in a relaxed mood and more tolerant with their children after going for a brisk walk. Additionally, highlighting activities that do not interfere with the time that is required to fulfil other commitments (e.g., doing housework more vigorously, playing more energetic games with the children) and, for mothers, the benefits of regular PA to weight control may also be useful.
- Health messages could also express the voices of active others as wanting parents to be active and, for mothers, having this message expressed also by their partners.
- To help parents achieve more personal control over their PA behaviour, health messages should promote PA as enhancing energy levels to combat lack of motivation and identify solutions to the inconvenience factors that make regular PA difficult to achieve (e.g., using the weekend to do more PA). Furthermore, targeting messages about time might also be beneficial (e.g., using the work lunch hour to go for brisk walks, helping parents identify sedentary leisure-time activities and encouraging them to replace these with more active leisure-time activities).

Acknowledgement

No financial support has been received for this project.

References

1. Australian Bureau of Statistics. *Physical activity in Australia: A snapshot, 2004-05, Australia (4835.0.55.001)*. Canberra: Australian Bureau of Statistics; 2006.
2. Begg S, Vos T, Barker B et al. *Burden of Disease and Injury in Australia 2003*. Canberra: AIHW; 2007.
3. World Health Organization. *Global strategy on diet, physical activity and health: Physical activity*. Geneva: WHO Press; 2003.
4. Bellows-Riecken KH, Rhodes RE. A birth of inactivity? A review of physical activity and parenthood. *Prev Med* 2008; 46:99-110.
5. Müller-Riemenschneiderl F, Reinhold T, Nocon, M et al. Long-term effectiveness of interventions promoting physical activity: A systematic review. *Prev Med* 2008; 47:354-368.
6. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process* 1991; 50:179-211.
7. Hagger MS, Chatzisarantis N, Biddle SJH. A meta-analytic review of the theories of reasoned action and planned behavior in physical activity: predictive validity and the contribution of additional variables. *J Sport Exerc Psychol* 2002; 24:3-32.
8. Eiser JR, Van de Plight J. Beliefs and values in the nuclear debate. *J Appl Soc Psychol* 1979; 9:524-536.
9. Van de Plight J, De Vries NK. Belief importance in expectancy-value models of attitudes. *J Appl Soc Psychol* 1998; 28:1339-1354.
10. Symons D, Hausenblas HA. Elicitation studies and the theory of planned behavior: a systematic review of exercise beliefs. *Psychol Sport Exerc* 2005; 6:1-31.
11. Rhodes RE, Blanchard CM, Courneya KS, Plotnikoff RC. Identifying belief-based targets for the promotion of leisure-time walking. *Health Educ Behav* 2009, 36:381-393.
12. Conn VS, Tripp-Reimer T, Maas M. Older women and exercise: theory of planned behavior beliefs. *Public Health Nursing* 2003, 20:153-162.
13. White KM, Terry DJ, Troup C, Rempel LA. Behavioral, normative and control beliefs underlying low-fat dietary and regular physical activity behaviors for adults diagnosed with type 2 diabetes and/or cardiovascular disease. *Psychol Health Med* 2007: 485-494.

14. Boudreau F, Godin G. Understanding physical activity intentions among French Canadians with type 2 diabetes: an extension of Ajzen's theory of planned behaviour. *IJBNPA* 2009, 6:35.
15. Ajzen I, Fishbein M. *Belief, attitude, intention, and behavior: an introduction to theory and research*. Reading: Addison-Wesley; 1975.
16. Australian Bureau of Statistics. *Australian social trends, data cube – family and community (4102.0)*. Canberra: Australian Bureau of Statistics; 2009.
17. Gagne C, Godin G. The theory of planned behavior: Some measurement issues concerning belief-based variables. *J Appl Soc Psychol* 2000; 30:2173-2193.
18. Sutton S. Using social cognitive models to develop health behaviour interventions: problems and assumptions, Chapter 11, in *Changing health behaviour*, Rutter D, Quine L Eds. Buckingham: Open University Press; 2002.
19. Weinstein N.D. Misleading tests of health behavior theories. *Annals of Behav Med* 2007; 33:1-10.
20. Australian Government Department of Health and Aging. *An active way to better health. National physical activity guidelines for adults*. Canberra: Commonwealth of Australia; 2005.
21. Haskell WL, Lee I-M, Pate RR et al. Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation* 2007; 116:1081-1093.
22. Hamilton K, White KM. Identifying parents' perceptions about physical activity: a qualitative exploration of salient behavioural, normative and control beliefs among mothers and fathers of young children. *J Health Psychol* doi:10.1177/1359105310364176.
23. Fishbein M, von Haeften I, Appleyard J. The role of theory in developing effective interventions: implications from Project SAFER. *Psychol Health Med* 2001; 6:223-238.
24. Hornik R, Woolf KD. Using cross-sectional surveys to plan message strategies. *Social marketing Quarterly* 1999, 5:34-41.
25. Lewis B, Ridge D. Mothers reframing physical activity: family oriented politicization, transgression and contested expertise in Australia. *Soc Sci Med*. 2005;60:2295-2306.
26. Hamilton K, White KM. Understanding parental physical activity: meanings, habits, and social role influence. *Psychol Sport Exerc*, 2010, 11:275-285.

27. Nomaguchi KM, Bianchi SM. Exercise time: gender differences in the effects of marriage, parenthood, and employment. *J Marriage Fam*, 2004, 66:413-430.
28. Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: the evidence. *Canadian Medical Association Journal*, 174, 2006:801-809.
29. NSW Health. *Proactive mums: Promoting physical activity through child care centres. A randomized controlled trial summary report*. Sydney: NSW Department of Health; 2003.
30. McIntyre CA, Rhodes RE. Correlates of leisure-time physical activity during the transition to motherhood. *Woman Health* 2009; 49:66-83.

Table 1. Means, Standard Deviations, and Correlations for Physical Activity Beliefs with Intention and Behaviour for the Total Sample and Correlations between Physical Activity Beliefs with Intention and Behaviour by Gender

| Parent beliefs | Mean (SD) | Intention (r) | Behaviour (r) | Intention (r) | | | Behaviour (r) | | |
|--|------------|---------------|---------------|-------------------|-------------------|----------|-------------------|-------------------|----------|
| | | | | Total | Fathers | Fisher's | Mothers | Fathers | Fisher's |
| | | | | (<i>n</i> = 580) | (<i>n</i> = 580) | <i>Z</i> | (<i>n</i> = 252) | (<i>n</i> = 206) | <i>Z</i> |
| Behavioural Beliefs | | | | | | | | | |
| Improve my physical health and fitness | 6.58(0.91) | 0.12** | -0.02 | 0.13* | 0.12* | 0.12 | 0.05 | -0.08 | 1.38 |
| Improve my mental well-being | 6.49(0.96) | 0.23*** | 0.04 | 0.23*** | 0.24*** | -0.13 | 0.10 | -0.01 | 1.17 |
| Increase the risk of sustaining pain/ injury | 3.53(1.90) | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.04 | -0.06 | 1.06 |
| Give me the opportunity to socialise | 4.31(2.00) | 0.08 | 0.11* | 0.11 | 0.05 | 0.72 | 0.12 | 0.09 | 0.32 |
| Improve my parenting practices | 4.57(1.85) | 0.22*** | 0.17*** | 0.24*** | 0.22*** | 0.25 | 0.23*** | 0.14* | 0.99 |
| Interfere with my other commitments | 4.12(1.87) | -0.28*** | -0.30*** | -0.26*** | -0.30*** | 0.52 | -0.29*** | -0.33*** | 0.47 |
| Help me to lose weight/control my weight | 6.00(1.52) | 0.19*** | 0.04 | 0.33*** | 0.05 | 3.51*** | 0.12 | -0.06 | 2.56** |
| Normative Beliefs | | | | | | | | | |
| Spouse/partner | 5.52(1.73) | 0.26*** | 0.19*** | 0.48*** | 0.14* | 4.58*** | 0.25*** | 0.11 | 1.53 |
| Children | 4.45(1.99) | 0.16*** | 0.14** | 0.20** | 0.11 | 1.11 | 0.14* | 0.14* | 0.00 |
| Other family members | 4.73(1.83) | 0.23*** | 0.16** | 0.27*** | 0.18** | 1.14 | 0.17** | 0.16* | 0.11 |

| | | | | | | | | | |
|----------------------------|------------|----------|----------|----------|----------|-------|----------|----------|---------|
| Friends | 4.72(1.56) | 0.23*** | 0.15** | 0.28*** | 0.18** | 1.27 | 0.16* | 0.15* | 0.11 |
| Healthcare professionals | 5.54(1.68) | 0.13** | 0.03 | 0.08 | 0.19** | -1.34 | -0.02 | 0.09 | -1.27 |
| Work colleagues | 4.41(1.79) | 0.18*** | 0.17*** | 0.20** | 0.16** | 0.50 | 0.12 | 0.22** | -1.09 |
| People I exercise with | 4.18(2.07) | 0.40*** | 0.25*** | 0.37*** | 0.42*** | -0.71 | 0.26*** | 0.23** | 0.34 |
| Control Beliefs | | | | | | | | | |
| Lack of time | 5.29(1.84) | -0.30*** | -0.38*** | -0.26*** | -0.34*** | 1.05 | -0.37*** | -0.39*** | 0.25 |
| Tiredness and fatigue | 4.54(1.94) | -0.29*** | -0.28*** | -0.25*** | -0.33*** | 1.05 | -0.29*** | -0.27*** | -0.23 |
| Inconvenient | 3.99(1.93) | -0.39*** | -0.38*** | -0.37*** | -0.42*** | 0.71 | -0.39*** | -0.36*** | -0.37 |
| Lack of motivation | 3.84(2.03) | -0.45*** | -0.45*** | -0.40*** | -0.50*** | 1.51 | -0.46*** | -0.42*** | -0.52 |
| Cost | 2.16(1.68) | -0.15*** | -0.11* | -0.13* | -0.18** | 0.61 | -0.13* | -0.07 | -0.64 |
| Illness and injury | 2.45(1.74) | 0.15*** | 0.10* | 0.09 | 0.20** | -1.19 | -0.02 | 0.22*** | -2.59** |
| Intention | 5.38(1.74) | | | | | | | | |
| Behaviour (number of days) | 3.04(2.05) | | | | | | | | |

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, two-tailed.

Table 2. Summary of the Multiple Regression Analyses Identifying the Key Belief Targets for an Intervention to Increase Parents' Regular Physical Activity

| | β | R ² | df | F | % fully accepting the belief ^a | % strongly accepting the belief ^b | Both |
|--|----------|----------------|--------|----------|--|---|-------|
| Parents' Intention | | | | | | | |
| Behavioural beliefs | | 0.16 | 5, 567 | 21.96*** | | | |
| Interfere with my other commitments | -0.28*** | | | | 11.4% | 12.9% | 24.3% |
| Improve my mental well-being | 0.20*** | | | | 70.0% | 17.9% | 87.9% |
| Help me to lose weight/control my weight | 0.14** | | | | 54.1% | 22.2% | 76.3% |
| Improve my parenting practices | 0.11* | | | | 21.0% | 13.6% | 34.6% |
| Improve my physical health and fitness | -0.09 | | | | - | - | - |
| Normative beliefs | | 0.18 | 7, 525 | 16.09*** | | | |
| People I exercise with | 0.35*** | | | | 28.1% | 16.0% | 44.1% |
| Spouse/partner | 0.11* | | | | 42.2% | 18.6% | 60.8% |
| Healthcare professionals | -0.09 | | | | - | - | - |
| Other family members | 0.06 | | | | - | - | - |
| Friends | 0.06 | | | | - | - | - |
| Work colleagues | -0.03 | | | | - | - | - |

| | | | | | | | |
|---------------------|--------------------------------------|----------|------|--------|----------|-------|-------|
| | Children | 0.01 | | | - | - | - |
| Control beliefs | | | 0.28 | 6, 570 | 37.46*** | | |
| | Lack of motivation | -0.31*** | | | 18.6% | 14.3% | 32.9% |
| | Lack of time | -0.12** | | | 7.1% | 4.0% | 11.1% |
| | Inconvenient | -0.20*** | | | 14.5% | 13.1% | 27.6% |
| | Illness and injury | 0.14*** | | | 42.4% | 21.9% | 64.3% |
| | Cost | -0.06 | | | - | - | - |
| | Tiredness and fatigue | -0.01 | | | - | - | - |
| <hr/> | | | | | | | |
| Parents' behaviour | | | | | | | |
| <hr/> | | | | | | | |
| Behavioural beliefs | | | 0.11 | 3, 451 | 19.35*** | | |
| | Interfere with my other commitments | -0.29*** | | | 11.4% | 12.9% | 24.3% |
| | Improve my parenting practices | 0.13** | | | 21.0% | 13.6% | 34.6% |
| | Give me the opportunity to socialise | 0.07 | | | - | - | - |
| Normative beliefs | | | 0.08 | 6, 416 | 5.62*** | | |
| | People I exercise with | 0.20*** | | | 28.1% | 16.0% | 44.1% |
| | Spouse/partner | 0.08 | | | - | - | - |
| | Children | 0.05 | | | - | - | - |

| | | | | |
|-----------------------|----------|--------|----------|-------------------|
| Other family members | 0.05 | - | - | - |
| Friends | -0.04 | - | - | - |
| Work colleagues | 0.02 | - | - | - |
| Control beliefs | 0.29 | 6, 448 | 30.16*** | |
| Lack of motivation | -0.34*** | | | 18.6% 14.3% 32.9% |
| Lack of time | -0.24*** | | | 7.1% 4.0% 11.1% |
| Inconvenient | -0.14** | | | 14.5% 13.1% 27.6% |
| Illness and injury | 0.08 | | | - - - |
| Tiredness and fatigue | 0.05 | | | - - - |
| Cost | 0.01 | | | - - - |

Note. ^aScale measured on a 7-point scale (1 = extremely unlikely to 7 = extremely likely) with a score of 7 indicating fully accepting the belief for positively worded items and a score of 1 indicating fully accepting the belief for negatively worded items. ^bScale measured on a 7-point scale (1 = extremely unlikely to 7 = extremely likely) with a score of 6 indicating strongly accepting the belief for positively worded items and a score of 2 indicating strongly accepting the belief for negatively worded items. Note. Regression analyses performed separately on the data for mothers and fathers revealed similar patterns of results; however, as expected behavioural beliefs about weight loss was significant for mothers' intentions ($\beta = 0.29$, $p < 0.001$) but not for fathers' intentions ($\beta = 0.04$, $p = 0.477$); normative beliefs about spouse/partner approval was significant for mothers' intentions ($\beta = 0.23$, $p = 0.001$) but not for fathers' intentions ($\beta = 0.01$, $p = 0.889$); and control beliefs about illness/injury was significant for fathers' behaviour ($\beta = 0.13$, $p = 0.044$) but not for mothers' behaviour ($\beta = 0.03$, $p = 0.610$).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.