



HHS Public Access

Author manuscript

J Behav Med. Author manuscript; available in PMC 2017 August 01.

Published in final edited form as:

J Behav Med. 2016 August ; 39(4): 599–609. doi:10.1007/s10865-016-9744-8.

Overcoming barriers to exercise among parents: A social cognitive theory perspective

Emily L. Mailey¹, Siobhan M. Phillips², Deirdre Dlugonski³, and David E. Conroy⁴

¹Department of Kinesiology, Kansas State University

²Department of Preventive Medicine, Northwestern University Feinberg School of Medicine

³Department of Kinesiology, East Carolina University

⁴Department of Kinesiology, The Pennsylvania State University

Abstract

Parents face numerous barriers to exercise and exhibit high levels of inactivity. Examining theory-based determinants of exercise among parents may inform interventions for this population. The purpose of this study was to test a social-cognitive model of parental exercise participation over a 12-month period. Mothers (n=226) and fathers (n=70) of children <16 completed measures of exercise, barriers self-efficacy, perceived barriers, and exercise planning at baseline and one year later. Panel analyses were used to test the hypothesized relationships. Barriers self-efficacy was related to exercise directly and indirectly through perceived barriers and prioritization/planning. Prioritization and planning also mediated the relationship between perceived barriers and exercise. These paths remained significant at 12 months. These results suggest efforts to increase exercise in parents should focus on improving confidence to overcome exercise barriers, reducing perceptions of barriers, and helping parents make specific plans for prioritizing and engaging in exercise.

Keywords

mothers; fathers; physical activity; barriers; self-efficacy; self-regulation

Introduction

Although the physical and mental health benefits of exercise are well-documented, a majority of adults in developed countries are not engaging in enough exercise to reap these benefits (Dumith et al., 2011). One population that consistently exhibits high levels of inactivity is parents. A review (Bellows-Riecken & Rhodes, 2008) supported a negative relationship between physical activity and parenthood, with over 80% of the studies reviewed indicating parents were less active than non-parents (summary $d=0.41$). Although early research on exercise among parents focused primarily on mothers (Albright et al.,

Conflict of interest: The authors declare that they have no conflict of interest.

Ethical approval: All procedures involving human participants were performed 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.

2006; Brown et al., 2001; Cody & Lee, 1999; Fahrenwald et al., 2004; Urizar et al., 2005; Verhoef & Love, 1994) because they have traditionally shouldered a greater proportion of parenting responsibilities, recent research suggests fathers are taking on more childcare responsibilities and report similar barriers to exercise as their female counterparts (Mailey et al., 2014). Indeed, there is evidence that both mothers' and fathers' exercise levels are negatively impacted by parenthood (Rhodes et al., 2014a; Berge et al., 2011; Hull et al., 2010; Nomaguchi & Bianchi, 2004; Gaston et al., 2014), perhaps due to the multitude of barriers they face. In order to develop interventions to increase exercise among parents, more research is needed to understand the factors that influence exercise participation in both mothers and fathers.

One theoretical approach that may be useful for understanding parents' exercise behavior is Social Cognitive Theory (SCT; Bandura 1986). The central component of SCT is self-efficacy, or one's beliefs in his or her capabilities to carry out a specific course of action (Bandura, 1997). Self-efficacy beliefs influence the activities individuals choose to pursue, the effort they expend in pursuit of their goals, the outcomes they expect for their efforts, and the extent to which they persist when they encounter barriers. For populations that face numerous exercise barriers, their confidence to overcome those barriers, or barriers self-efficacy, may be an especially important predictor of exercise initiation and maintenance (Oman & King, 1998). Individuals with high barriers self-efficacy believe they are in control of their behavior, and consequently are more likely to devise strategies to continue engaging in exercise when faced with obstacles. Thus, proponents of SCT would argue that parents' perceptions of their ability to cope with demands, as opposed to the actual magnitude of the demands, is of paramount importance for explaining their subsequent behavior (Bandura, 1982).

SCT also identifies self-regulation, defined as *the health goals people set for themselves and the concrete plans and strategies for realizing them*, as a key factor in the behavior change process (Bandura, 2005). Consistent with this view, several recent studies have found self-regulatory strategies such as planning to be a significant predictor of exercise participation among mothers (Dlugonski & Motl, 2014; Fjeldsoe et al., 2013; Mailey & McAuley, 2014). It seems that regularly active mothers still report numerous exercise barriers, but they use self-regulatory strategies to overcome key barriers and make time for exercise (Mailey et al., 2014). Not surprisingly, mothers who are adept at overcoming challenging barriers and prioritizing exercise also tend to report higher levels of self-efficacy to maintain an active lifestyle over time, which is consistent with the SCT perspective (Cramp & Brawley, 2006). Currently, the evidence to support the extent to which these social cognitive variables influence exercise participation among fathers is limited, with the exception of one study that found action planning predicted fathers' physical activity behavior one week later (Hamilton et al., 2012).

Undoubtedly, parents face numerous barriers to exercise, including lack of time, lack of social support, family obligations, fatigue, and guilt (Cramp & Bray, 2011). While time constraints are common to the general population, they may be intensified in parents as a result of adding childcare responsibilities to existing occupational and household duties, which leaves little time for leisure activities (Albright et al., 2006; Brown et al., 2001;

Pereira et al., 2007; Verhoef & Love, 1994). Access to social support may alleviate some of these time constraints, whereas a lack of social support could exacerbate them (Albright et al., 2006; Miller et al., 2002). Furthermore, many parents identify family responsibilities as their top priority, and may not value exercise enough to prioritize it over time with their children (Lewis & Ridge, 2005). Long-standing cultural discourses that emphasize taking care of others' needs first and foremost (Henderson & Allen, 1991; Miller & Brown, 2005) may contribute to feelings of guilt for taking time for oneself, especially among mothers. All of these barriers likely contribute to the high levels of inactivity among parents, and developing the confidence and skills to overcome key barriers may influence parents' ability to be physically active.

To date, a handful of studies have investigated theory-based correlates or determinants of exercise among parents, and results have found beliefs related to perceptions of control over time, fatigue, childcare, etc. are consistently related to exercise behavior (McIntyre & Rhodes, 2009; Hamilton & White, 2011; Rhodes et al., 2014b). However, these studies have not examined how these perceptions relate to self-regulatory strategies that are considered more proximal volitional processes that regulate behavior. Volitional strategies like planning, which are central to in contemporary social-cognitive models such as the Health Action Process Approach (HAPA; Schwarzer et al., 2007), appear to be integral to explaining exercise behavior among parents. Thus, research testing social cognitive models that include both motivational (e.g., self-efficacy) and volitional (e.g., planning) variables will improve our understanding of the nuanced relationship between self-efficacy and behavior. Furthermore, most studies have been cross-sectional or have focused on new parents and/or mothers exclusively. Thus, longitudinal studies that incorporate a broad sample of mothers and fathers are needed. Based on evidence that social-cognitive constructs such as perceived barriers, self-efficacy to overcome barriers, and use of self-regulatory strategies may be central to our understanding of parents' exercise engagement over time, the overall purpose of this study was to test a social-cognitive model of parental exercise participation over a 12-month period. Specifically, we examined both cross-sectional and longitudinal relationships between mothers' and fathers' perceived barriers (i.e., sociostructural factors), self-efficacy for overcoming barriers, prioritization and planning of exercise, and exercise behavior. We hypothesized that barriers self-efficacy would be positively related to parents' leisure-time exercise behavior both directly and indirectly via perceived barriers, prioritization, and planning, and that changes in these constructs would relate to changes in exercise across a one-year period.

Methods

All data were collected in the United States via online questionnaires. The procedures were approved by a university Institutional Review Board. The study was advertised on social media sites and via a university faculty/staff email announcement. Participants were informed that it was a study of physical activity among parents. To incorporate a broad sample of parents, mothers and fathers of children age 16 and under were eligible to complete the surveys. Advertisements provided a link to the online questionnaires (programmed with Qualtrics), which took approximately 15–20 minutes to complete. All participants provided informed consent online before proceeding with the surveys. After

completing all surveys, participants were instructed to provide an email address for contact purposes if they would be willing to participate in a follow-up one year later.

For the follow-up, participants received a total of three email reminders, spaced one week apart, to complete the questionnaires. Individuals who did not complete the questionnaires after the third reminder were considered lost to follow-up. At each time point, individuals who completed all measures could enter an email address to be eligible for one of twenty \$50 gift cards. The gift card drawings took place approximately one month after each period of data collection had ceased. Baseline data were collected in summer of 2013, and follow-up data were collected in summer of 2014.

Measures

Demographics—Participants provided demographic information, including sex, age, race, marital status, education, and income. In addition, they indicated the number and age(s) of their child(ren).

Exercise—Leisure-time exercise behavior was assessed using the Godin Leisure-Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1985). This brief measure asks participants to report the current frequency of engaging in strenuous (e.g., running; heart beats rapidly), moderate (e.g., easy bicycling or swimming; not exhausting), and light intensity (e.g., bowling or golf; minimal effort) exercise during leisure time (i.e., not including work or household activities) for at least 15 minutes per session during a typical week. For this study, to focus on activity consistent with global physical activity recommendations (WHO, 2016), a total moderate/vigorous physical activity (MVPA) score was calculated by multiplying the frequencies of strenuous and moderate activities by nine and five, respectively, and then summing the products. This measure is widely used and has previously demonstrated adequate test-retest reliability and concurrent validity with objective measures of physical activity and energy expenditure (Jacobs et al., 1993; Shephard, 2003).

Self-efficacy—The Barriers Self-efficacy Scale (McAuley, 1992) assessed participants' perceived capabilities to adhere to their exercise goals in the face of commonly identified barriers to participation (e.g., lack of support, schedule conflicts). Consistent with recommendations for measuring barriers self-efficacy (McAuley, et al., 2012), the original measure was modified slightly to include barriers specific to parents (e.g., lack of childcare, feeling guilty about spending time apart from children). For each of the 13 items, participants responded by indicating their confidence to participate in exercise on a 100-point percentage scale ranging from 0% (*not at all confident*) to 100% (*highly confident*). Total strength of self-efficacy was determined by calculating the mean of all items, resulting in a maximum possible efficacy score of 100. Internal consistency for this scale was very good ($\alpha=0.93$).

Barriers—The exercise barriers scale presented ten commonly endorsed barriers to exercise. This scale was modified from the original Exercise Barriers Scale (Sechrist et al., 1987) to include barriers that might be applicable to parents (e.g., I feel guilty for taking

time away from my family). For each barrier, participants indicated the extent to which it interfered with their exercise routine, on a scale from 1 (*not at all*) to 5 (*always*). Barriers were summed to yield a total score (Range: 10–50; $\alpha=0.83$) with higher score reflecting greater barriers.

Planning—The Exercise Planning and Scheduling Scale (Rovniak et al., 2002) was used to assess self-regulatory behavior. After a critical psychometric evaluation of the scale, Elavsky and colleagues (2012) determined that the motivational (prioritization) and volitional (planning/scheduling) items of the scale represent distinct constructs and should be aggregated into separate subscales. The prioritization subscale includes four items that reflect the extent to which exercise is a priority despite time constraints (i.e., “I never seem to have enough time to exercise,” “Exercise is generally not a high priority when I plan my schedule,” “Finding time for exercise is difficult for me,” and “When I am very busy, I don’t do much exercise”). The planning/scheduling subscale consists of four items that reflect action planning, or intentionally scheduling exercise as part of one’s weekly routine (i.e., “I schedule all events in my life around my exercise routine,” “I schedule my exercise at specific times each week,” “I plan my weekly exercise schedule,” and “I write my planned activity sessions in an appointment book or calendar”). For each item, participants responded on a scale from 1 (*does not describe*) to 5 (*describes completely*). Negatively worded items on the prioritization subscale were reverse scored, so that higher scores reflected greater prioritization of exercise and more frequent scheduling/planning. Each subscale (Range: 4–20) demonstrated good internal consistency (Prioritization $\alpha=0.89$ – 0.90 ; Planning $\alpha=0.80$ – 0.82).

Data Analysis

To identify the most salient exercise barriers among parents, we calculated the percentage of participants who indicated that each individual barrier interferes with exercise ‘a lot’ or ‘always’. For descriptive purposes, we examined these frequencies in the total sample and in subgroups of the parent population (i.e., mothers vs. fathers, parents working full-time vs. parents working part-time or not at all, parents with children under 5 years vs. parents with children 5 years old, and parents of one child vs. parents of multiple children). Differences between these percentages by subgroup were examined using a chi-squared statistic.

To examine the hypothesized relationships, panel analyses within a covariance framework were conducted in Mplus V6.0 (Muthen & Muthen, 1998). Panel models are ideally suited to the analysis of hypothesized, theoretically-based relationships. This approach allowed for the examination of the hypothesized relationships at baseline and those same relationships among changes in the constructs at 12 months controlling for all other variables in the model. The robust full-information maximum likelihood (FIML) estimator was used in the present (Arbuckle, 1996; Enders, 2001; Enders & Bandalos, 2001) study as a result of preliminary analyses indicating missing data were missing at random (MAR). The extent of missing data ranged from 0% (planning) to 2.4% (barriers self-efficacy) at baseline. Missing data at 12-months ranged from 29.1% (MVPA) to 34.5% (barriers self-efficacy), and was largely the result of loss to follow-up.

The following hypothesized relationships were tested: (a) a direct path from self-efficacy to barriers, prioritization, planning, and MVPA; (b) a direct path from barriers to prioritization; (c) a direct path from prioritization to planning and MVPA; and (d) a direct path from planning to MVPA (Figure 1). The models were tested controlling for covariates including age, gender, number of children, age of youngest child, education, income, employment status, and race. Stability coefficients were calculated to reflect correlations between the same variables across time while controlling for the influence of all other variables in the model (Kessler & Greenberg, 1981). Hence, cross-lagged paths were interpreted as measures of residualized change. In addition, the modification indices were examined for other potential relationships among model constructs and potential reciprocal relationships.

The chi-square statistic assessed absolute fit of the model to the data (Joreskog & Sorbom, 1996). The standardized root means residual (SRMR) and Comparative Fit Index (CFI) were also used to determine the fit of the model. SRMR values approximating 0.08 or less demonstrate close fit of the model while CFI values of .90 indicate a minimally acceptable fit value and values approximating 0.95 or greater are indicative of a good fit (Hu & Bentler, 1999).

Results

Participant Characteristics

A total of 296 parents completed the surveys at baseline, and 203 (68.6%) participated in the 12-month follow-up. Demographic characteristics of the full baseline sample are presented in Table 1. On average, participants were 36.2 years of age ($SD=7.0$). A majority of the sample was female (76.4%), White (92.8%) and married or partnered (90.5%). Additionally, most of the sample worked full time (73.6%), had a household income greater than or equal to \$45,000 (81.4%), and had a college degree (88.5%). On average, participants had 1.9 children (range: 1–6). Participants lost to follow-up were significantly younger ($p=.04$) and less educated ($p=.04$) than those who completed the study. The two groups did not differ on any other demographic or baseline variables.

Individual Barrier Frequencies

The percent of participants that endorsed specific exercise barriers are presented in Table 2. Overall, the most frequently reported barriers reflected a perceived lack of time due to competing responsibilities. Several demographic differences also emerged. Parents working full-time reported lack of time and guilt as salient barriers more so than parents with other employment statuses. Parents with young children (<5 years old) endorsed lack of time, other responsibilities, and being too tired more often than parents of older children, whereas parents of older children endorsed lack of support/encouragement more frequently than parents of younger children. Finally, bad weather was a more prevalent barrier for fathers than mothers.

Relationships Between Model Constructs and Demographic Variables

At baseline, being employed full-time was significantly ($p<0.05$) associated with higher exercise barriers ($\beta= 0.13$), and higher education was associated with greater planning ($\beta=$

0.11). At follow-up, having a younger child was significantly associated with increased exercise barriers ($\beta = -0.13$), and increased income ($\beta = 0.12$) and younger age ($\beta = -0.17$) were associated with increased barriers self-efficacy. No other relationships between any of the assessed demographic factors and model constructs were significant at baseline or follow-up.

Model Results

Table 3 contains the means, standard deviations, and t-values for each of the factors in the model. There were no statistically significant differences in any of the model variables between baseline and follow-up. At baseline, 54% of mothers and 53% of fathers were meeting current physical activity recommendations (e.g., engaging in 150 minutes per week of moderate intensity physical activity or 75 minutes per week of vigorous intensity physical activity), according to the previously established MVPA cutpoint of 25 (Godin, 2011).

The hypothesized model provided a good overall fit to the data ($\chi^2=87.9$ $df=40$, $p= 0.001$; CFI=0.97; SRMR= 0.04). This model is shown in Figure 1. Overall, the stability coefficients ranged from 0.33 (MVPA) to 0.67 (barriers self-efficacy).

At baseline, more efficacious individuals reported significantly ($p < 0.05$) fewer perceived barriers ($\beta = -0.60$), greater exercise prioritization ($\beta = 0.25$) and planning ($\beta = 0.24$) and higher participation in MVPA ($\beta = 0.14$). Participants who reported more barriers were significantly less likely to prioritize exercise ($\beta = -0.56$). Higher prioritization was related to both greater planning ($\beta = 0.46$) and MVPA ($\beta = 0.40$). Finally, participants who engaged in more planning/scheduling reported greater MVPA ($\beta = 0.24$). Self-efficacy had a significant indirect influence on MVPA via barriers, prioritization and planning. The indirect paths via prioritization alone and planning alone were also significant.

At 12-month follow-up, participants whose barriers self-efficacy increased had significantly fewer perceived barriers ($\beta = -0.37$), were more likely to prioritize exercise ($\beta = 0.15$), and reported higher MVPA ($\beta = 0.26$). Reductions in perceived barriers were associated with increased exercise prioritization ($\beta = -0.37$), and increased prioritization was associated with increased planning ($\beta = 0.41$) and MVPA ($\beta = 0.25$). Additionally, participants who increased planning/scheduling were more likely to report increased MVPA ($\beta = 0.13$). There were statistically significant indirect paths between residual changes in self-efficacy and residual changes in MVPA via prioritization, alone, and via the paths between self-efficacy and MVPA involving perceived barriers, prioritization, and planning. Changes in self-efficacy were not directly related to changes in planning and the indirect relationship between self-efficacy and MVPA via planning was also not significant. Table 4 shows the relationships among all model constructs. Overall, the model accounted for 45.1% and 58.5% of the variance in MVPA at baseline and follow-up, respectively.

Discussion

The purpose of this study was to test a social-cognitive model of parents' exercise participation over a 12-month period. This study builds on previous investigations of exercise among parents by testing a longitudinal model in a sample that included both

mothers and fathers at various stages of parenthood. Our hypothesis that barriers self-efficacy would be related to exercise both directly and indirectly (through perceived barriers and prioritization/planning) was supported. Furthermore, results indicated changes in these variables were related to changes in MVPA across a one-year period. These findings enhance our understanding of parental exercise behavior and support Bandura's assertions that self-regulation plays an important role in determining participation in health behaviors such as exercise (Bandura, 2005). Specifically, our results suggest that increasing barriers self-efficacy, reducing perceptions of barriers, and helping parents make specific plans for prioritizing and engaging in exercise might be useful approaches for increasing exercise among parents.

Overall, the results of this study are consistent with previous research that has tested social cognitive models of exercise in other populations. For example, Ayotte and colleagues (2010) found self-efficacy was related to physical activity both directly and indirectly through perceived barriers and self-regulatory behaviors in a sample of older married couples. In a prospective analysis of physical activity among college students, Rovniak et al. (2002) found self-efficacy had the greatest total effect on physical activity 8 weeks later, and these effects were largely mediated by self-regulation. In the context of a church-based intervention for adults, Anderson et al. (2010) found changes in self-efficacy were related to changes in self-regulation, which were, in turn, related to changes in physical activity. Several interventions specifically targeting parents have also identified self-efficacy and planning as key mediators of intervention effects (Cramp & Brawley, 2009; Fjeldsoe et al., 2013; Mailey & McAuley, 2014). Thus, our results add to a growing body of literature that highlights the social-cognitive pathways by which exercise behavior is influenced.

As postulated by Bandura and demonstrated in several previous studies of parents' exercise (Cramp & Bray, 2011; Cramp & Brawley, 2009; Mailey & McAuley, 2014), self-efficacy played an important role in explaining parents' exercise behavior. Our results suggest individuals with high self-efficacy for overcoming barriers perceived less interference from common exercise barriers, were more likely to prioritize and plan exercise into their schedules, and engaged in more MVPA. Individuals with high barriers self-efficacy are likely to use problem-solving strategies to overcome barriers when they encounter them, whereas individuals with low barriers self-efficacy may be overwhelmed by barriers to the extent that they do not invest any effort to pursue the behavior (Bandura, 1982). Importantly, our barriers measure did not assess *actual* barriers, but the extent to which individuals *perceived* barriers interfered with their physical activity. Thus, it is quite likely that two parents could face identical time constraints, but the individual who is confident in his/her ability to maintain exercise despite these constraints does not perceive time to be a formidable barrier.

Our results also support previous research that has identified planning as an important correlate of exercise among parents (Dlugonski & Motl, 2014; Fjeldsoe et al., 2013; Mailey & McAuley, 2014). Planning is a self-regulatory skill that involves identifying and scheduling occasions for exercise, which helps individuals translate their intentions into action (Carraro & Gaudreau, 2013; Norman & Conner, 2005; Sniehotta et al., 2005). The present study makes an important distinction between the volitional processes of goal

prioritization and planning/scheduling and suggests prioritization is an important precursor to action planning that may further facilitate the translation of motivation to action (Elavsky et al., 2012). This focus on the volitional stage of behavior change is a useful extension of SCT applications that put greater emphasis on the motivational stage, and is consistent with other contemporary social-cognitive models such as the HAPA (Schwarzer et al., 2007). For parents who are attempting to balance childcare, work, and household obligations, explicitly scheduling time for exercise may be essential to ensuring it is prioritized (Rhodes, Naylor, & McKay, 2010). Importantly, self-regulatory skills can be learned and practiced, but the use of such skills is likely to be influenced by individuals' perceptions of their capabilities to manage barriers. People who perceive many insurmountable barriers, and are not confident in their ability to overcome them, are not likely to plan and schedule exercise into their lives (Ayotte et al., 2010, Bandura 1997).

The longitudinal study design allowed us to examine how changes in key SCT constructs are related to changes in MVPA over time. Thus, several mediating variables can be identified as potential targets for future interventions. First, enhancing parents' self-efficacy for overcoming barriers appears to be important. Self-efficacy is highly modifiable and is strongly influenced by past performance accomplishments that either enhance or undermine individuals' perceptions. Some previous investigations have reported declines in barriers self-efficacy during exercise interventions, particularly among inactive individuals who may overestimate their ability to overcome barriers before they begin pursuing the behavior and encounter an array of challenges (Hughes et al., 2004; Moore et al., 2006; McAuley et al., 2011). As such, it is especially important to design interventions for parents to facilitate gradual accumulation of mastery experiences by emphasizing small, manageable changes in behavior and developing feasible strategies for overcoming key barriers. Consistent with the notion that self-efficacy perceptions are also subject to social influences (i.e., modeling and feedback from others), several studies have demonstrated that greater social support from family and friends is associated with higher self-efficacy for overcoming barriers (Anderson et al., 2010; Ayotte et al., 2010; Fraser & Rogers, 2012). Furthermore, research has identified social support, particularly from one's spouse, as a key facilitator of exercise among parents (Albright et al., 2006; Miller et al., 2002; Mailey et al., 2014), so interventions might consider targeting mothers and fathers together to promote a supportive environment at home and enhance parents' confidence for overcoming barriers (Hong et al., 2005).

Teaching self-regulatory strategies such as action and coping planning to help parents translate their exercise intentions to action might also be a useful intervention strategy. For example, after setting an exercise goal (e.g., to walk for 30 minutes 3x/week), individuals should specify exactly when and where they will carry out the behavior (e.g., I will walk to the park immediately after dinner on Monday, Wednesday and Friday), which facilitates automatization when relevant situational cues are encountered (Gollwitzer, 1999). Furthermore, coping planning involves anticipating potential barriers and having plans in place for overcoming them (e.g., If it is raining, I will complete an exercise video at home). Previous studies have shown exercise participation is enhanced when action plans are supplemented by coping plans (Snihotta et al., 2006, Pakpour et al., 2011). On the other hand, a meta-analysis found that using barrier identification as an intervention technique was

associated with lower self-efficacy post-intervention, which suggests that the timing and delivery of coping planning may be important (Ashford et al., 2010). Identifying barriers prior to initiating exercise may highlight the challenges one is likely to face, thus augmenting perceived inefficacy to carry out the behavior. Once participants have initiated an exercise program they wish to maintain, however, effective problem-focused coping is imperative to help individuals accumulate mastery experiences that lead to greater confidence that they will successfully overcome future obstacles.

Previous studies have highlighted several demographic factors that may be associated with exercise behavior among parents (Bellows-Riecken & Rhodes, 2008). Although not a primary aim of this study, we did include demographic factors as covariates in the model to examine their relationships with exercise and the SCT constructs. Our analyses yielded few significant relationships between demographic variables and model constructs, which suggests these relationships may be generalizable to broad samples of parents. Of note, working full-time and having children under 5 were associated with higher perceived barriers, and our descriptive analysis of frequently reported perceived barriers further highlighted the significant challenges faced by these subgroups of the parent population when it comes to making time for exercise. These findings are consistent with previous research and suggest these individuals may especially benefit from interventions designed to reduce perceived barriers (Nomaguchi & Bianchi, 2004). Future studies should test this SCT model in specific groups of parents (i.e., mothers vs. fathers) to further improve our understanding of these relationships.

This study had a number of limitations that must be acknowledged. First, the exercise data are self-reported and limited to leisure-time bouts of MVPA. Parents may be accumulating physical activity in other domains (e.g., work, household) that were not captured by the measure utilized. In addition, because the individuals who completed the surveys voluntarily participated in a study about exercise, the sample should not be considered representative of the overall population. It is possible that individuals with interest in exercise were more inclined to complete the surveys than inactive individuals. Additionally, the current sample had high levels of income and education that may further limit the generalizability of these results. Exercise behavior may differ among parents with low income and/or education whose priorities and access to resources differ. Although the study was longitudinal, the design was not experimental so relations between changes in model constructs are still correlational, and causal inferences are not appropriate. Finally, while we sought to test a social cognitive model of exercise behavior in parents, we acknowledge that the model tested is not comprehensive and does not include the outcome expectations or goals/intentions constructs originally proposed by Bandura. In addition, we included the volitional processes of prioritization and planning, which are more explicitly included in many contemporary social-cognitive models. Given the role-specific nature of exercise barriers, we elected to test a streamlined model of constructs that are related to parents' barriers, confidence to overcome these barriers, and strategies for translating exercise intentions to action. Future research should test this model in more diverse populations of parents and in the context of exercise interventions that explicitly target the theoretical antecedents of physical activity identified in this study.

In conclusion, this study adopted a social-cognitive perspective to improve our understanding of factors associated with changes in parents' exercise behavior. Parents report numerous barriers to exercise participation, and our results suggest teaching methods to cope with barriers may be useful in interventions targeting this population. Improving parents' confidence in their ability to overcome barriers is likely to elicit reductions in perceived barriers, increased use of important self-regulatory strategies, and ultimately increased participation in exercise.

References

- Albright CL, Maddock JE, Nigg CR. Physical activity before pregnancy and following childbirth in a multiethnic sample of healthy women in Hawaii. *Women & Health*. 2006; 42:95–110.
- Anderson ES, Winett RA, Wojcik JR, Williams DM. Social cognitive mediators of change in a group randomized nutrition and physical activity intervention: Social support, self-efficacy, outcome expectations and self-regulation in the guide-to-health trial. *Journal of Health Psychology*. 2010; 15:21–32. DOI: 10.1177/1359105309342297 [PubMed: 20064881]
- Arbuckle, J. Full information estimation in the presence of incomplete data. In: Marcoulides, G., Schumacker, R., editors. *Advanced structural equation modeling: Issues and techniques*. Mahwah, NJ: Lawrence Erlbaum Associates; 1996. p. 243-278.
- Ashford S, Edmunds J, French DP. What is the best way to change self-efficacy to promote lifestyle and recreational physical activity? A systematic review with meta-analysis. *British Journal of Health Psychology*. 2010; 15:265–288. [PubMed: 19586583]
- Ayotte BJ, Margrett JA, Hicks-Patrick J. Physical activity in middle-aged and young-old adults: The roles of self-efficacy, barriers, outcome expectancies, self-regulatory behaviors and social support. *Journal of Health Psychology*. 2010; 15:173–185. DOI: 10.1177/1359105309342283 [PubMed: 20207661]
- Bandura A. Self-efficacy mechanism in human agency. *American Psychologist*. 1982; 37:122–147.
- Bandura, A. *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall; 1986.
- Bandura, A. *Self-efficacy: The exercise of control*. New York: W.H. Freeman and Company; 1997.
- Bandura A. The primacy of self-regulation in health promotion. *Applied Psychology*. 2005; 54:245–254.
- Bellows-Riecken KH, Rhodes RE. A birth of inactivity? A review of physical activity and parenthood. *Preventive Medicine*. 2008; 46(2):99–110. [PubMed: 17919713]
- Berge JM, Larson N, Bauer KW, Neumark-Sztainer D. Are parents of young children practicing healthy nutrition and physical activity behaviors? *Pediatrics*. 2011; 127(5):881–887. DOI: 10.1542/peds.2010-3218 [PubMed: 21482603]
- Brown PR, Brown WJ, Miller YD, Hansen V. Perceived constraints and social support for active leisure among mothers with young children. *Leisure Sciences*. 2001; 23:131–144.
- Carraro N, Gaudreau P. Spontaneous and experimentally induced action planning and coping planning for physical activity: A meta-analysis. *Psychology of Sport and Exercise*. 2014; 15:311–318.
- Cody R, Lee C. Development and evaluation of a pilot program to promote exercise among mothers of preschool children. *International Journal of Behavioral Medicine*. 1999; 6:13–29. [PubMed: 16250689]
- Cramp AG, Brawley LR. Moms in motion: A group-mediated cognitive behavioral physical activity intervention. *International Journal of Behavioral Nutrition and Physical Activity*. 2006; 3:23. [PubMed: 16925809]
- Cramp AG, Brawley LR. Sustaining self-regulatory efficacy and psychological outcome expectations for postnatal exercise: Effects of a group-mediated cognitive behavioural intervention. *British Journal of Health Psychology*. 2009; 14:595–611. [PubMed: 19055871]

- Cramp AG, Bray SR. Understanding exercise self-efficacy and barriers to leisure-time physical activity among postnatal women. *Maternal and Child Health Journal*. 2011; 15:642–651. [PubMed: 20495858]
- Dlugonski D, Motl RW. Social cognitive correlates of physical activity among single mothers with young children. *Psychology of Sport & Exercise*. 2014; 15:637–641.
- Dumith SC, Hallal PC, Reis RS, Kohl HW III. Worldwide prevalence of physical inactivity and its association with human development index in 76 countries. *Preventive Medicine*. 2011; 53(1–2): 24–28. DOI: 10.1016/j.ypmed.2011.02.017 [PubMed: 21371494]
- Enders CK. The impact of nonnormality on full information maximum-likelihood estimation for structural equation models with missing data. *Psychological Methods*. 2001; 6:352. [PubMed: 11778677]
- Enders CK, Bandalos DL. The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling*. 2001; 8:430–457.
- Elavsky S, Doerksen SE, Conroy DE. Identifying priorities among goals and plans: A critical psychometric reexamination of the Exercise Goal-Setting and Planning/Scheduling Scales. *Sport, Exercise, and Performance Psychology*. 2012; 1:158–172.
- Fahrenwald NL, Atwood JR, Walker SN, Johnson DR, Berg K. A randomized pilot test of “Moms on the Move”: A physical activity intervention for WIC mothers. *Annals of Behavioral Medicine*. 2004; 27:82–90. [PubMed: 15026292]
- Fjeldsoe BS, Miller YD, Marshall AL. Social cognitive mediators of the effect of the MobileMums intervention on physical activity. *Health Psychology*. 2013; 32(7):729–738. DOI: 10.1037/a0027548 [PubMed: 22612557]
- Fraser SN, Rodgers WM. The influence of general and exercise specific social support on self-efficacy for overcoming barriers to cardiac rehabilitation. *Journal of Applied Social Psychology*. 2012; 42:1811–1829.
- Gaston A, Edwards SA, Doelman A, Tober J. The impact of parenthood on Canadians’ objectively measured physical activity: An examination of cross-sectional population-based data. *BMC Public Health*. 2014; 14:1127. [PubMed: 25363082]
- Godin G. The Godin-Shephard leisure-time physical activity questionnaire. *The Health & Fitness Journal of Canada*. 2011; 4(1):18–22.
- Godin G, Shephard RJ. A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Sciences*. 1985; 10(3):141.
- Gollwitzer PM. Implementation intentions: Strong effects of simple plans. *American Psychologist*. 1999; 54:493–503.
- Hamilton K, Cox S, White KM. Testing a model of physical activity among mothers and fathers of young children: Integrating self-determined motivation, planning, and the theory of planned behavior. *Journal of Sport & Exercise Psychology*. 2012; 34:124–145. [PubMed: 22356879]
- Hamilton K, White KM. Identifying key belief-based targets for promoting regular physical activity among mothers and fathers with young children. *Journal of Science and Medicine in Sport*. 2011; 14(2):135–142. DOI: 10.1016/j.jsams.2010.07.004 [PubMed: 20800540]
- Henderson KA, Allen KR. The ethic of care: Leisure possibilities and constraints for women. *Society and Leisure*. 1991; 14(1):97–113. DOI: 10.1080/07053436.1991.10715374
- Hong TB, Franks MM, Gonzalez R, Keteyian SJ, Franklin BA, Artinian NT. A dyadic investigation of exercise support between cardiac patients and their spouses. *Health Psychology*. 2005; 24:430–434. [PubMed: 16045379]
- Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*. 1999; 6:1–55.
- Hughes SL, Seymour RB, Campbell R, Pollak N, Huber G, Sharma L. Impact of the fit and strong intervention on older adults with osteoarthritis. *Gerontologist*. 2004; 44:217–228. DOI: 10.1093/geront/44.2.217 [PubMed: 15075418]
- Hull EE, Rofey DL, Robertson RJ, Nagle EF, Otto AD, Aaron DJ. Influence of marriage and parenthood on physical activity: A 2-year prospective analysis. *Journal of Physical Activity & Health*. 2010; 7(5):577. [PubMed: 20864752]

- Jacobs DR, Ainsworth BE, Hartman TJ, Leon AS. A simultaneous evaluation of 10 commonly used physical activity questionnaires. *Medicine and Science in Sports and Exercise*. 1993; 25:81–91. [PubMed: 8423759]
- Jöreskog, K., Sörbom, D. LISREL 8: User's reference guide. Chicago: Scientific Software International; 1996.
- Kessler, R., Greenberg, D. Linear panel analysis: models of quantitative change. New York: Academic Press; 1981.
- Lewis B, Ridge D. Mothers reframing physical activity: Family oriented politicism, transgression and contested expertise in Australia. *Social Science & Medicine*. 2005; 60(10):2295–2306. DOI: 10.1016/j.socscimed.2004.10.011 [PubMed: 15748677]
- Mailey EL, Huberty J, Dinkel D, McAuley E. Physical activity barriers and facilitators among working mothers and fathers. *BMC Public Health*. 2014; 14(1):657. [PubMed: 24974148]
- Mailey EL, McAuley E. Impact of a brief intervention on physical activity and social cognitive determinants among working mothers: A randomized trial. *Journal of Behavioral Medicine*. 2014; 37:343–355. DOI: 10.1007/s10865-013-9492-y [PubMed: 23338616]
- McAuley E. The role of efficacy cognitions in the prediction of exercise behavior in middle-aged adults. *Journal of Behavioral Medicine*. 1992; 15(1):65–88. DOI: 10.1007/BF00848378 [PubMed: 1583674]
- McAuley E, Mailey EL, Mullen SP, Szabo AN, Wójcicki TR, White SM, ... Kramer AF. Growth Trajectories of Exercise Self-Efficacy in Older Adults: Influence of Measures and Initial Status. *Health Psychology*. 2011; 30:75–83. DOI: 10.1037/a0021567 [PubMed: 21038962]
- McAuley, E., White, SM., Mailey, EL., Wojcicki, TR. Exercise-related self-efficacy. In: Tenenbaum, G.Eklund, RC., Kamata, A., editors. *Measurement in Sport and Exercise Psychology*. Champaign, IL: Human Kinetics; 2012. p. 239-249.
- McIntyre CA, Rhodes RE. Correlates of leisure-time physical activity during transitions to motherhood. *Women & Health*. 2009; 49:66–83. [PubMed: 19485235]
- Miller YD, Brown WJ. Determinants of active leisure for women with young children – An “ethic of care” prevails. *Leisure Sciences*. 2005; 27:405–420.
- Miller YD, Trost SG, Brown WJ. Mediators of physical activity behavior change among women with young children. *American Journal of Preventive Medicine*. 2002; 23:98–103.
- Moore SM, Charvat JM, Gordon NH, Pashkow F, Ribisl P, Roberts BL, Rocco M. Effects of a CHANGE intervention to increase exercise maintenance following cardiac events. *Annals of Behavioral Medicine*. 2006; 31:53–62. DOI: 10.1207/s15324796abm3101_9 [PubMed: 16472039]
- Muthen, L., Muthen, B. Mplus 6.0. [Computer software]. Los Angeles, CA: Muthen & Muthen; 1998.
- Nomaguchi KM, Bianchi SM. Exercise time: Gender differences in the effects of marriage, parenthood, and employment. *Journal of Marriage and Family*. 2004; 66(2):413–430.
- Norman P, Conner M. The Theory of Planned Behavior and exercise: Evidence for the mediating and moderating roles of planning on intention-behavior relationships. *Journal of Sport and Exercise Psychology*. 2005; 27:488–504.
- Oman RF, King AC. Predicting the adoption and maintenance of exercise participation using self-efficacy and previous exercise participation rates. *American Journal of Health Promotion*. 1998; 12:154–161. [PubMed: 10176088]
- Pakpour AH, Zeidi IM, Chatzisarantis N, Molsted S, Harrison AP, Plotnikoff RC. Effects of action planning and coping planning within the theory of planned behaviour: A physical activity study of patients undergoing haemodialysis. *Psychology of Sport & Exercise*. 2011; 12:609–614.
- Pereira MA, Rifas-Shiman SL, Kleinman KP, Rich-Edwards JW, Peterson KE, Gillman MW. Predictors of change in physical activity during and after pregnancy: Project Viva. *American Journal of Preventive Medicine*. 2007; 32:312–319. [PubMed: 17383562]
- Rhodes RE, Blanchard CM, Benoit C, Levy-Milne R, Naylor PJ, Downs DS, Warburton DER. Physical activity and sedentary behavior across 12 months in cohort samples of couples without children, expecting their first child, and expecting their second child. *Journal of Behavioral Medicine*. 2014a; 37:533–542. DOI: 10.1007/s10865-013-9508-7 [PubMed: 23606310]
- Rhodes RE, Blanchard CM, Benoit C, Levy-Milne R, Naylor PJ, Downs DS, Warburton DER. Belief-level markers of physical activity among young adult couples: Comparisons across couples

without children and new parents. *Psychology & Health*. 2014b; 29:1320–1340. [PubMed: 24894608]

Rhodes RE, Naylor PJ, McKay HA. Pilot study of a family physical activity planning intervention among parents and their children. *Journal of Behavioral Medicine*. 2010; 33:91–100. [PubMed: 19937106]

Rovniak LS, Anderson ES, Winett RA, Stephens RS. Social cognitive determinants of physical activity in young adults: A prospective structural equation analysis. *Annals of Behavioral Medicine*. 2002; 24:149–156. [PubMed: 12054320]

Schwarzer R, Schuz B, Ziegelmann JP, Lippke S, Luszczaynska A, Scholz U. Adoption and maintenance of four health behaviors: Theory-buידed longitudinal studies on detnal flossing, seat belt use, dietary behavior, and physical activity. *Annals of Behavioral Medicine*. 2007; 33:156–166. [PubMed: 17447868]

Sechrist KR, Walker SN, Pender NJ. Development and psychometric evaluation of the Exercise Benefits/Barriers Scale. *Research in Nursing & Health*. 1987; 10:357–365. [PubMed: 3423307]

Shephard RJ. Limits to the measurement of habitual physical activity by questionnaires. *British Journal of Sports Medicine*. 2003; 37:197–206. [PubMed: 12782543]

Sniehotta FF, Scholz U, Schwarzer R. Bridging the intention-behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychology and Health*. 2005; 20:143–160.

Sniehotta FF, Scholz U, Schwarzer R. Action plans and coping plans for physical exercise: A longitudinal intervention study in cardiac rehabilitation. *British Journal of Health Psychology*. 2006; 11:23–37. [PubMed: 16480553]

Urizar GG, Hurtz SQ, Albright CL, Ahn DK, Atienza AA, King AC. Influence of maternal stress on successful participation in a physical activity intervention: The IMPACT project. *Women & Health*. 2005; 42:63–82. [PubMed: 16782676]

Verhoef MJ, Love EJ. Women and exercise participation: The mixed blessings of motherhood. *Health Care for Women International*. 1994; 15:297–306. [PubMed: 8056646]

World Health Organization. Recommended levels of physical activity for adults aged 18–64 years. 2016. Retrieved February 11, 2016 from http://www.who.int/dietphysicalactivity/factsheet_adults/en/

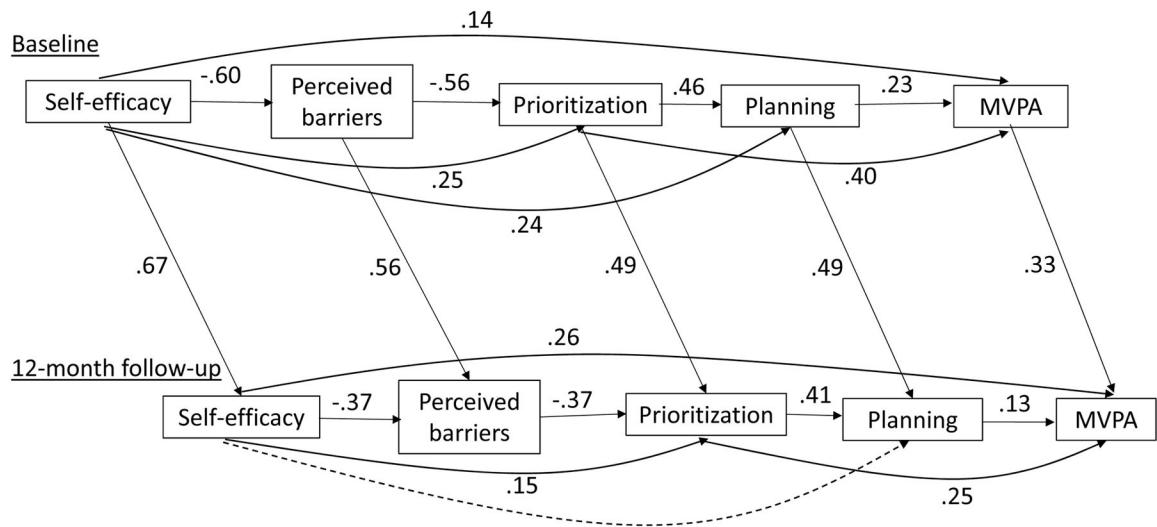


Figure 1. Social cognitive model of parents' exercise behavior across a 12-month period
 Note. All solid paths are statistically significant ($p < .05$).

Table 1Participant demographic characteristics ($N = 296$)

Variable	Categories	Mean (SD)/Frequency (%)
Sex	Female	226 (76.4)
	Male	70 (23.6)
Age, <i>years</i>		36.2 (7.0)
Marital Status	Married/Partnered	268 (90.5)
	Single/Divorced/Separated	27 (9.1)
No. of children		1.9 (1.0)
Age of youngest child, <i>years</i>		4.5 (4.4)
Employment	Employed Full Time	218 (73.6)
	Employed Part Time	32 (10.8)
	Homemaker	30 (10.1)
	Other	16 (5.4)
Education	Less than college degree	34 (11.4)
	College degree	97 (32.8)
	Post-graduate degree	165 (55.7)
Annual household income	\$45,000	241 (81.4)
Race	Caucasian	269 (90.9)

Table 2
Most frequently reported perceived exercise barriers among the overall sample (N = 296) and subgroups at baseline

Barrier	Overall Sample	Fathers	Mothers	with kids <5	with kids 5	1 child	> 1 child	full-time	other
I am busy tending to other responsibilities (childcare, work, housework, etc.)	59.1(1)	54.3(1)	60.6(1)	64.4(1)*	50.0(1)*	57.9(1)	60.2(1)	62.4(1)	50.0(1)
I don't have enough time to fit it in.	49.3(2)	54.0(2)	47.8(2)	54.8(2)*	39.8(2)*	47.4(2)	50.8(2)	53.7(2)*	37.2(2)*
I am too tired	39.5(3)	35.7(3)	40.7(3)	44.7(3)*	30.6(3)*	37.7(3)	40.9(3)	41.3(3)	34.6(3)
I feel unmotivated	29.4(4)	30.0(4)	29.2(5)	29.8(4)	28.7(5)	28.1(4)	29.8(4)	30.7(5)	25.6(4)
I feel guilty for taking time away from my family	27.1(9)	24.3(5)	30.1(4)	28.2(5)	29.6(4)	28.1(4)	29.3(4)	33.5(4)*	15.4(6)*
I don't have anyone to exercise with	20.9(5)	20.0(6)	21.2(6)	18.6(6)	25.0(6)	20.2(6)	21.5(6)	22.5(6)	16.7(5)
I don't enjoy exercise	13.2(6)	12.9(8)	13.3(7)	12.8(8)	13.9(7)	11.4(8)	14.4(7)	12.8(8)	14.1(7)
I don't have access to exercise facilities	13.2(6)	14.3(7)	12.8(8)	14.4(7)	11.1(9)	13.2(7)	13.3(8)	13.8(7)	11.5(8)
I don't receive any support or encouragement	9.1(8)	8.6(10)	9.3(9)	6.4(10)*	13.9(7)*	7.9(10)	9.9(9)	11.0(9)	3.8(10)
The weather is bad	7.1(9)	12.9(8)*	5.3(10)*	8.5(9)	4.6(10)	8.8(9)	6.1(10)	7.3(10)	6.4(9)

Note: Values are % of sample or subgroup who reported that the barrier interferes with their ability to engage in regular exercise 'a lot' or 'always';

* indicates a significant difference ($p < .05$) between groups based on Chi-square test comparing proportions for each barrier item

Table 3

Descriptive statistics and paired t-test comparisons between baseline (T1) and follow-up (T2)

	Mean (SD) T1	Mean (SD) T2	<i>t</i> -value	<i>p</i> -value
MVPA	29.23 (24.04)	28.42 (21.90)	-.62	.54
BARSE	42.93 (22.83)	44.07 (23.29)	.86	.39
Barriers	24.99 (7.09)	25.08 (7.51)	.25	.80
Prioritization	11.32 (5.02)	11.26 (4.91)	-.25	.80
Planning	9.03 (4.64)	9.38 (4.78)	1.39	.17

Note: MVPA = Godin Leisure Time Exercise Questionnaire Moderate to Vigorous Physical Activity; BARSE = Barriers Self-Efficacy Scale; Barriers = Exercise Barriers Scale; Prioritization/Planning = Exercise Planning and Scheduling Scale

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 4

Correlations among all variables in the model

	MVPA	BARSE	Barriers	Prioritize	Plan	MVPA_T2	BARSE_T2	Barriers_T2	Prioritize_T2	Plan_T2
MVPA	–									
BARSE	.49	–								
Barriers	-.50	-.61	–							
Prioritize	.63	.59	-.71	–						
Plan	.54	.53	-.45	.61	–					
MVPA_T2	.66	.53	-.49	.57	.54	–				
BARSE_T2	.48	.68	-.55	.58	.53	.62	–			
Barriers_T2	-.49	-.57	.74	-.68	-.50	-.57	-.64	–		
Prioritize_T2	.59	.56	-.65	.80	.65	.69	.65	-.77	–	
Plan_T2	.49	.44	-.45	.58	.70	.57	.48	-.55	.72	–

Note: MVPA = Godin Leisure Time Exercise Questionnaire Moderate to Vigorous Physical Activity; BARSE = Barriers Self-Efficacy Scale; Barriers = Exercise Barriers Scale; Prioritize/Plan = Exercise Planning and Scheduling Scale; All correlations are statistically significant ($p < .01$)