Predicting Changes Across 12 Months in Three Types of Parental Support Behaviors and Mothers' Perceptions of Child Physical Activity.

Rhodes, R. E. et al.

2015

Running Head: Parental Support of Child Physical Activity

Predicting Changes across 12 Months in Three Types of Parental Support Behaviors and Mothers' Perceptions of Child Physical Activity

Abstract

Background: Parental support has been established as the critical family-level variable linked to child physical activity with encouragement, logistical support, and parent-child co-activity as key support behaviors. **Purpose**: To model these parental support behaviors as well as family demographics as mediators of mothers' perceptions of child physical activity using theory of planned behavior (TPB) across two, six-month waves of longitudinal data. **Method:** A representative sample of Canadian mothers (N = 1,253) with children aged five to 13 years of age, completed measures of TPB, support behaviors, and child physical activity**. Results:** Autoregressive structural equation models showed that intention and perceived behavioral control explained support behaviors, yet child age (inverse relationship) and family income were independent predictors. The three support behaviors explained 19-42% of the variance in child physical activity between participants, but analyses of change showed much smaller effects. **Conclusions**: Mothers' support behaviors are related to perceived child physical activity, but support is dependent on perception of control, child age and family income.

Key Words: Theory of planned behavior, perceived behavioral control, intention, attitude, parent-child relationship, parenting

The health benefits of regular physical activity are difficult to overstate (1). Among children and adolescents, physical activity and high physical fitness protect against high blood pressure, high blood cholesterol, metabolic syndrome, low bone density, depression, and obesity (2) and form the behavioral patterns necessary to foster health benefits across the life course (3). Unfortunately, few children in developed countries are sufficiently active to reap these benefits (4, 5) and this high prevalence of inactivity suggests that promotion efforts are paramount for public health.

Logically, school-based and home-based physical activity environments are the most salient to target in promotion initiatives for children. School-based initiatives have shown some efficacy in behavior change (6, 7), but there is clearly a need to promote physical activity within the family unit. Children spend considerable time within the care of their parents, and indeed parents appear to be the 'gatekeepers' of physical activity during family time (8, 9). Unfortunately, physical activity interventions focused on the family are limited and have resulted in negligible changes (10); a recent review of family interventions reported low success in producing behavior change (11).

Effective interventions are likely dependent on a sound theoretical understanding of the potential determinants of a behavior (12, 13). Thus, a better understanding of parental influence on child physical activity may inform the design and success of family interventions in the future (14). Such influence has received considerable research attention and is acknowledged as one of the drivers of physical activity levels among 12-17 year olds (15). Rhodes and Quinlan (11), for example, identified 15 reviews on this particular topic. Parental influence generally includes two basic factors: parental role modeling (performing physical activity themselves) and parental support (facilitation of child physical activity), although parental attitudes about physical activity

and parenting styles and family cohesion have also received limited research attention (11). Of these factors, parental support has the most consistent and robust evidence as a correlate of child physical activity (8, 16-22). For example, in a recent meta-analysis (23), parental modeling was weakly associated with child physical activity (summary $r = 0.16$, 95% CI .09-.24) while the parental support relationship was medium in size (summary $r = 0.38$, 95% CI .30-.46). Thus, attention to parent support as a means to changing youth physical activity appears important for successful family-based intervention.

Parental support is a collection of behaviors with its core components being encouragement (e.g., providing information and pressure to be active), logistical support (e.g., facilitating physical activity, signing children up for activities, transportation to activities), and co-activity (i.e., parent-facilitated support via activity together and not mere modeling) (24-27). All of these support behaviors have been established as correlates of child physical activity with no clear support behavior that is more important than the other (16, 21, 27, 28). Still, despite the overwhelming evidence for the importance of these parental support behaviors for child physical activity, few studies have contributed to our understanding of these behaviors. Previous research has produced mixed results as to whether attitudes about the benefits/importance of child activity is a predictor of parental support; most other predictors, such as parental enjoyment of physical activity, social capital, gender of parent, age of parent, parental ethnicity, income, resources, safety, parental education and perceptions of child competence, have produced either null or small effects (14, 26, 29-31).

An alternate approach to understanding parental support of child physical activity, undertaken by Rhodes and colleagues (32), was to apply a behavioral theory focused on parental support as a behavior onto itself with specific motives and barriers. Specifically, parental support

was examined as an outcome in a theory of planned behavior framework (33). This theory suggests that the proximal determinant of behavior is one's intention to perform that behavior and intention is predicted by attitude (evaluation of the behavior), subjective norm (perceived social pressure), and perceived behavioral control (ease/difficulty of performing the behavior). Additionally, perceived behavioral control may influence behavior directly to the extent that the behavior in question is not completely under one's volition (33). Commensurate with the model, intention to provide parental support was predicted by attitudes about support with a large effect size. Attitudes about the general benefits of child physical activity were not associated with intentions to provide parental support. By contrast, the strongest predictor of child physical activity, in the large effect size range, was control over support (32).

These findings suggest there may be utility to understanding support as a behavior with distinct motives unto itself in order to designate targets for intervention. Thus, targeting control over support behaviors and attitudes about support would seem important. Nevertheless, the study was limited by a cross-sectional design that can evaluate between-participant correlates of behavior but does not allow for the prediction of within-participant change in support behaviors and child physical activity. Analysis of change in physical activity can shed insight on factors that may be important during interventions (34-36). Furthermore, Rhodes and colleagues (32) did not separate the affective (enjoyable) component from the instrumental (useful) component in their attitude measure. Research in the physical activity domain has shown considerable distinction between these two attitude components (37, 38), and it seems likely that the affective component of parental support may be a more important predictor of support intention/behavior than the instrumental component. Indeed, the instrumental component of support is likely to be highly advocated by parents much like parental attitudes about child physical activity (31).

Finally, all prior research on the correlates of parental support, to our knowledge, has focused on support behavior as an aggregate of encouragement, logistic and co-activity behaviors or a general support construct. Given that these behaviors are distinct, it may be prudent to evaluate separate models of each type of support behavior to examine whether differences exist in their respective antecedents. For example, encouragement may be less dependent on control than logistical support and co-activity behavior, where a parent has to be present or have access to appropriate resources to support a child activity at a particular time.

Therefore, the purpose of this study was to advance prior research by Rhodes et al. (32) by modeling specific parental support behaviors of encouragement, logistical support, and co-activity within an adapted theory of planned behavior framework that included a multi-component conception of attitude across two six-month waves of longitudinal data. We hypothesized that 1) parental control over support and intention to support would predict both between-participant differences and within-participant changes in support behavior and these parental support behaviors would mediate parental support cognitions and mothers' perceived child physical activity, and 2) affective attitudes about support would be a stronger predictor of intention than instrumental attitudes. We also explored whether the type of support behavior moderated the findings, and speculated that logistical and co-activity support behaviors may have larger perceived behavioral control and support behavior relationships than encouragement behavior.

Method

Study Design and Participants

A national Canadian online panel survey was conducted via a hired vendor, Vision Critical, in January, 2013 followed by follow-up surveys in August, 2013 and, January, 2014.

The research team was not involved in the selection and the data collection process of participants. Instead, Vision Critical has a consumer online panel database of approximately 110,000 people who agree to answer surveys in return for small gifts. The original aim for data collection was to assess the "Bring Back Play" campaign launched by ParticipACTION. 'Bring Back Play' was an ongoing national (Canadian) promotion campaign launched before the assessments (March, 2012); the campaign was delivered through television and digital media. The objectives of the campaign were to highlight the importance of active play as a source of physical activity and to provide parents with some ideas on how to reduce the barriers to their child from playing more often. Further information about the Brick Back Play campaign can be found at http://www.participaction.com/get-moving/bring-back-play/.

The target population of the Bring Back Play campaign was mothers of children aged 5 to 13 years. Mothers also often represent the key respondent in family-based physical activity initiatives (10, 39) so they were chosen to represent the family unit (instead of fathers) in this survey. Children/tweens are also more likely to require active support from their parents than adolescents who can navigate transportation and leisure-time activities by themselves or with their peers supporting the limiting of age from 5 to 13 years of age (8). The sample was stratified by province and population density. A secondary data-analysis and dissemination waiver was approved by the human research ethics board of the institution of the first author. Of the 1,253 participants surveyed in time-one (January, 2013), 724 (58%) returned to respond to the survey in time-two (August, 2013) and 452 (62% from time 2; 34% from time 1) returned to respond in time-three (January, 2014).

Measures

As part of the measurement of the social cognitive constructs, physical activity for children and adolescents was defined as daily activity of at least 60 minutes of moderate-to-vigorous-

intensity accumulated throughout the day as per Canadian guidelines (40). It was described that children can be physically active in sports, school activities, playing with friends, or walking to school. Physical activities were considered any movement that increases heart rate and makes a child out-of-breath some of the time. Examples of activities, such as running, brisk walking, dancing, swimming, in-line skating, skateboarding, soccer, basketball, and football were provided. When parents had more than one child within the 5-13 year range, they were asked to think of their child whose birthday is closest to the date of the study as the referent for the questions in time one and reminded of this referent in subsequent assessments.

Parental support of these physical activities was broken into three separate series of questions. Participants were asked about 1) encouragement of child sport and physical activity, 2) driving or providing transportation for their child to engage in sport or physical activity, and 3) playing sport or engaging in physical activity with their child.

Attitude about child support of physical activity. Two items, based on Rhodes et al. (32), were adapted to each of the "encouragement," "logistical support" and "co-activity" behaviors respectively. The items were based on the direct assessment technique for measuring attitude in the theory of planned behavior (41) and included one item for instrumental (i.e., beneficial) and affective (i.e., enjoyable) properties of an attitude and phrased as performing each respective support behavior for physical activity most days of the week (e.g., encouraging my child to do physical activity most days of the week would be beneficial). The items were evaluated on a 5-point Likert-type scale from strongly agree (5) to strongly disagree (1).

Perceived behavioral control over child physical activity support. This was assessed using two items recommended by Ajzen (41) as direct measures of perceived behavioral control with a phrase that holds motivation constant (i.e., if I wanted to) in order to attempt to account

for any confounds in perceived ability versus perceived willingness (42). The items were adapted to each of the "encouragement," "logistical support" and "co-activity" behaviors respectively (i.e., two items per support model). For the first item, participants were asked how easy (5) or difficult (1), on a 5- point scale, they thought it would be to engage in the support behavior most days of the week, while the second item asked participants how confident they were that they could do the support behavior, from very confident (5) to not at all confident (1) (e.g., If I wanted to, I am confident I could encourage my child to do physical activity or play sports most days of the week). Reliability of the two item measures was acceptable for time 1 (encouragement α = .77; logistical support = α = .86; co-activity α = .80) and time 2 (encouragement α = .74; logistical support = α = .87; co-activity α = .80) assessments.

Intention to provide support for child physical activity. Intention was measured in a format suggested by Ajzen (41) and previously validated in the physical activity domain for assessing parental support behavior (32). Like the attitude and perceived behavioral control items, intention was adapted to each of the "encouragement," "logistical support" and "co-activity" behaviors respectively. The item followed the phrase "In the next six months, I intend to….(insert support behavior description)", evaluated on a 5-point Likert-type scale from strongly agree (5) to strongly disagree (1) (e.g., In the next six months, I intend to encourage my child to do physical activity or play sports most days of the week).

Parental Support Behavior. Commensurate with the three separate support behaviors, participants were asked about the frequency they: (1) encourage [their] child to participate in physical activity or play sports? (2) play outside with [their] child or do physical activity with [their] child? and (3) drive or provide transportation to a place [their] child can do physical activity or play sports? Responses were scored as 1 (never/rarely), 2 (about once a month), 3(1-2

times per week), 4 (most days), and 5(daily).

Mother-perceived physical activity **(of her child).** This perception was measured using the item "Over the past 7 days, on how many days was your child physically active for a total of at least 60 minutes per day?" The response format allowed parents to answer from zero to 7 days. The item is identical to the instrument from Rhodes et al. (32) and uses a similar scoring format to the Behavioral Risk Factor Surveillance Survey Instrument (43), Health Behaviour of School Aged Children Survey (44), LSI index of the Godin Leisure-Time Exercise Questionnaire (45, 46), and the International Physical Activity Questionnaire (47); but it is framed to correspond with contemporary child physical activity guidelines (40).

Analysis Plan

Data were analysed in SPSS 20 (SPSS Inc., Chicago, IL, USA) and AMOS Graphics 20. Descriptive statistics and bivariate correlations of all variables were computed. Furthermore, correlations among family demographics (e.g., age of child, family income, sex of child), campaign awareness and support behaviors and physical activity were examined. A structural equation model using maximum likelihood estimation was created to test the hypothesised model structure. Specifically, in accordance with the theory of planned behavior (33), demographic variables with an association between support behaviors or physical activity were modeled as antecedents of the two attitude constructs (instrumental, affective) and perceived control to provide child physical activity support, and these constructs were modeled as antecedents of intention to support child physical activity. Intention and perceived control were modeled with direct effects upon support behavior and this was subsequently modeled as an antecedent of child physical activity behavior. With the two item perceived behavioral control construct, the first item was fixed to 1.0 in order to create a metric scale, and all specific item error terms were freed

for estimation. With the single-item measures, the error variance was fixed to allow for an estimate of the inherent measurement error. This procedure followed a one minus the proposed reliability format (48). This approach provides for a reasonable estimate of how the indicator may perform if multiple items were available that had fair reliability. Providing some constraint to the measurement model is advantageous over assuming zero error (such as ordinary least squares multiple regression analyses). Using prior theory of planned behavior research (49) and the prior parental physical activity support model (32) as a guide, attitude items were fixed at 20% error, and intention was fixed at 15% error, while behavior was fixed to 35% error, which is commensurate with typical reliability estimates for this type of self-report measure.(47).

To examine how changes in the cognitions were associated with changes in behavior over six months, a cross-lagged model structure was employed where cognitions at six months (Time 2) were controlled for baseline values (Time 1), and behavior at the end of the second 6-month time (Time 3) was controlled for behavior at Time 2. These structural equation models were estimated for each support behavior separately (encouragement, logistical support, co-activity).

To examine whether the three models for each support behavior were similar or different, each structural path of the estimated model for one type of support was fixed to be equivalent to one of the other support models. For example, co-activity was fixed to the parameters of encouragement and the constrained and freed fit between these models was compared.

Model fit was assessed with several indices. As recommended for all structural equation models, the χ_2 test was used to test absolute model fit and the $\chi_{2\ \text{difference}}$ test was used to assess fit of the nested models that compared the various support behaviors. In addition, model

fit was assessed with the Comparative Fit Index (CFI; acceptable fit: > 0.95) and the Root Mean Square Error of Approximation (RMSEA; acceptable fit: < 0.06) (50).

Results

Participant Characteristics

Table 1 details the available baseline demographic and behavioral information of the mothers in the sample. Congruent with the regional stratification in the sample, data represents diversity of Canadian demographics (51). Mothers reported an average of 1.6 children with an equal sex distribution; and education, income, and employment reflected national averages (52). In terms of physical activity, 47.2% of mothers reported their child were meeting national guidelines which is consistent with other work showing that the majority of Canadian parents believe their children are meeting the guidelines (53).

Structural Equation Models of Parent Physical Activity Support Behaviors

Examination of the support behaviors and physical activity by family demographics and campaign awareness showed that child age and family income were significant ($p < .01$), while number of children, sex of the child, mother's education, employment status, and campaign awareness were not related ($p > .05$). Thus, child age and family income were added to the main analyses as antecedents of the theory of planned behavior. All outcome variables showed normal distribution (54). In our analyses to examine the pattern of missing data across the demographic, theory of planned behavior and behavioral variables showed that missingness from time 1 to time 2 was related ($p < .01$) to the age of the child referent ($r = -.12$) and household income ($r = .10$), where mothers of younger children (follow-up age M = 7.64, SD = 4.16; missing to follow-up age M = 6.72, SD = 3.76) and of lower income (follow-up > $75000 = 58%; missing to follow-up > $75000 = 48%) were less likely to return for the assessment at time 2. No theory of

planned behavior variables or behavioral variables were related to missingness from time 1 to time 2 and no variables were related to missingness from time 2 to time 3.Thus, these data were considered Missing-At-Random (MAR: i.e., the probability of missing a particular data point at 6-months is not related to its particular value, but can be dependent upon other variables) (55). Because the MAR data may lead to biased estimates, Full-Information-Maximum-Likelihood-estimation (FIML) was used in our structural equation models. FIML provides unbiased parameter and standard error estimates and fit statistics under MAR conditions and represents one of the most powerful analysis methods for handling missing data when compared to alternative options such as imputation algorithms (56, 57).

Descriptive statistics and bivariate correlations of the main constructs in the child physical activity support models can be found in Table 2. All theory of planned behavior constructs showed significant ($p < .01$) correlations with intention and the three parental support behaviors, generally in the medium- sized range (58). Intention to support and perceived control over support were subsequently correlated with child physical activity on both occasions: time 1 to time 2 and time 2 to time 3, yet the attitude constructs showed mixed findings (5 out of 6 significant correlations time 1 to time 2; 2 out of 6 significant findings time 2 to time 3). All three support behaviors were related ($p < .01$) to mother perceived child physical activity in the medium-sized range (58). Of note, encouragement behavior (time 2 M = 3.85, SD = 0.95; time 3 M 3.62, SD = 1.04) was significantly ($p < .01$; $d > .60$) higher than both logistical support (time 2 M = 2.98, SD = 1.13; time 3 M 2.91, SD = 1.19) and co-activity behavior (time 2 M = 2.97, SD = 1.13; time 3 M 2.59, SD = 1.05) within each time-point. Logistical support was also significantly ($p < .01$; $d = .27$) higher than co-activity at time 3 but the behaviors were not different at time 2.

The main analyses featuring the structural equation models resulted in a modest fit of these data for encouragement [χ^2 (85) = 348.10; $p < .01$; CFI = .95; RMSEA = .05], logistical support [χ^2 (85) = 430.04; $p < .01$; CFI = .95; RMSEA = .06], and co-activity behavior [χ^2 (85) = 343.08; $p < .01$; CFI = .96; RMSEA = .05]. An examination of whether child age and family income provided any additional direct effect on intention after controlling for attitude and perceived behavioral control was not significant (encouragement $\Delta\chi^2$ (2) = 1.40, $p > .01$; logistical $\Delta\chi^2$ (2) = 6.36, $p > .01$; co-activity $\Delta\chi^2$ (2) = 8.66; $p > .01$). Similarly, both child age and family income did not add directly to explaining child physical activity after accounting for encouragement and logistical support behavior, and only 1% additional variance was accounted for by freeing the path from income to physical activity (standardized effect = .15) after controlling for co-activity in time 2 (encouragement $\Delta\chi^2$ (2) = 6.17; logistical $\Delta\chi^2$ (2) = 4.01, $p > .01$; co-activity $\Delta\chi^2$ (2) = 13.68; $p < .01$). By contrast, age and income explained 5%, 10%, and 3% additional variance in encouragement, logistical support and co-activity respectively after controlling for intention to support and perceived behavioral control (encouragement $\Delta\chi^2$ (2) = 30.70; $p < .01$; logistical $\Delta\chi^2$ (2) = 67.22, $p < .01$; co-activity $\Delta\chi^2$ (2) = 25.31; $p < .01$).

Furthermore, a test of discriminant validity for the two types of attitudes, following the suggested approach by Anderson and Gerbing (59), showed that the two-component conceptualization of affective and instrumental attitude was superior in fit to a single attitude construct (encouragement $\Delta\chi^2$ (2) = 182.41; $p < .01$; logistical $\Delta\chi^2$ (2) = 105.75; $p < .01$; co-activity $\Delta\chi^2$ (2) = 187.95; $p < .01$).

The factor loadings for the latent perceived behavioral control variable were large and significant for the purported constructs, ranging from .74 to .91 across the models. The structural model is detailed in Figure 1 with the freed direct paths from child age and family income to

each of the three support behaviors at time 2. The model structure allows for both a between-participant examination of the theory of planned behavior model from time 1 to 2 (top) and an analysis of change accounting for within-participant variability in the analysis from time 2 to 3 (bottom). For the between-participant model, child age was not related to attitudes or perceived behavioral control about encouragement or logistical support, but it had direct effects ($p < .01$) on all constructs for co-activity (instrumental attitude standardized effect = -.20; affective attitude standardized effect = -.12; perceived behavioral control standardized effect = -.19). Family income, however, only had an effect ($p < .01$) on perceived behavioral control over logistical support (standardized effect = .12). Instrumental attitude (encouragement standardized effect = .12; logistical support standardized effect = .16), and perceived behavioral control of support (encouragement standardized effect = .62; logistical support standardized effect = .74; co-activity standardized effect = .78) predicted intention significantly and cumulatively explained 57-77% of its variance. Perceived behavioral control, however, was the dominant predictor with a large effect size. Parental support behavior was subsequently predicted by age of the child (encouragement standardized effect = -.16; logistical support standardized effect = -.22; co-activity standardized effect = -.13), family income (encouragement standardized effect = .14; logistical support standardized effect = .24; co-activity standardized effect = .12), intention (encouragement standardized effect = .21; logistical support standardized effect = .54; co-activity standardized effect = .17) and perceived behavioral control of support (encouragement standardized effect = .50; co-activity standardized effect = .58), explaining 42-59% of its variance. Consequently, perceived behavioral control, but not instrumental attitude, also had a significant ($p < .01$) indirect effect on parental support (encouragement standardized effect = .14; logistical support standardized effect = .42; co-activity standardized effect = .13) through

intention, and intention (encouragement standardized effect = .15; logistical standardized effect = .24) and perceived control (encouragement standardized effect = .40; logistical support standardized effect = .18; co-activity standardized effect = .36) had significant ($p < .01$) indirect effects on child physical activity via support. Interestingly, for co-activity support, child age had indirect effects through attitudes and perceived behavioral control on intention time 1 (standardized effect = -.18), co-activity time 2 (standardized effect = -.14), and physical activity time 2 (standardized effect = -.14).

For the within-participant analysis of change model, affective attitude (encouragement standardized effect = .18; logistical support standardized effect = .12; co-activity standardized effect = .12), and perceived behavioral control of support (encouragement standardized effect = .55; logistical support standardized effect = .65; co-activity standardized effect = .66) predicted change in intention significantly, along with instrumental attitude for logistical support behavior only (standardized effect = .14). Like the between-participant model, perceived behavioral control, was the dominant predictor with a large effect size. Change in parental support behavior was subsequently predicted by intention (encouragement standardized effect = .31; logistical support standardized effect = .15; co-activity standardized effect = .24) but not perceived behavioral control of parental support ($p > .05$). Perceived behavioral control, but not attitude, also had a significant ($p < .01$) indirect effect on support (encouragement standardized effect = .17; logistical support standardized effect = .12; co-activity standardized effect = .15) through intention but intention and perceived control did not have indirect effects on child physical activity via parental support ($p > .05$). By contrast, child age had significant ($p < .01$) indirect effects through time 1 theory of planned behavior constructs onto intention time 2 (standardized

effect = -.15), co-activity time 3 (standardized effect = -.15) and physical activity at time 3 (standardized effect = .14) for co-activity behavior.

Comparison of each parental support model through the nested analysis is presented in Table 3. Some noteworthy differences were present in the between-participant analyses and the theory of planned behavior model. Specifically, child age for co-activity had consistently larger correlations with theory of planned behavior constructs than encouragement or logistical support ($p < .01$) and the income and perceived behavioral control and income and parental support relationship was larger for logistical support than encouragement or co-activity ($p <.01$). The path from perceived behavioral control over parental support to intention was significantly ($p < .01$) larger for co-activity than encouragement and the path from perceived behavioral control to parental support behavior was larger ($p < .01$) for both encouragement and co-activity compared to logistical support. By contrast, the path from intention to parental support behavior was larger for logistical support compared to both co-activity and encouragement. Encouragement also had a larger correlation with child physical activity than both logistical support and co-activity. The within-participant analysis of change model had no moderators to predict parental support behavior.

Discussion

Child physical activity participation is low and parental support of child physical activity has been well-established as an important family-level correlate (23). Despite this reliable evidence for the importance of parental support in regular child physical activity, little research has been conducted to understand its antecedents. The purpose of this study was to advance prior research from Rhodes et al. (32) by modeling specific parental support behaviors of encouragement, logistical support, and co-activity within an adapted theory of planned behavior

framework that included a multi-component conception of attitude across two six-month waves of longitudinal data and controlled for relevant family demographics. The models fit our data moderately well and allowed for both a between-participant prediction of support and parent-perceived child physical activity behavior six-months after the initial cognitions were assessed as well as an analysis of change in these behaviors across six months. Taken together, the results yielded insight into the potential antecedents of these parental support behaviors which should inform future family-level intervention efforts.

First, we hypothesized that the adapted theory of planned behavior model would predict both between-participant differences and within-participant changes in parental support behavior. This hypothesis was generally supported. The models explained between 33-55% of the three support behaviors between-participants. The explained variance is similar to that of Rhodes et al. (32) and higher than typical health research using the theory of planned behavior (49). The discrepancy in these findings may be from the correction procedures for the attenuation from measurement error (thus inflating variance estimates) or from the more circumscribed behavior of support compared to general physical activity. The three support behaviors, commensurate with previous research (24-27), subsequently predicted child physical activity as hypothesized; additionally, perceived control predicted parental support/intention. Thus, perceived control over parental support and intentions to support show a connection to both parental support behavior and child physical activity through parental support behavior between-participants. Interestingly, although the theory of planned behavior was effective at predicting these parental support behaviors, it was unable to account for the relationship between child age or income and parental support. Instead, the relationships between demographics and physical activity were generally mediated by support behaviors, suggesting that maternal support may be the primary

intermediary between family demographics and child physical activity. Still, child age and income explained an additional 3-10% of the variance in the three parental support behaviors over the theory of planned behavior and did not provide much evidence for indirect effects via attitudes and perceived behavioral control. Only co-activity behavior and younger aged children showed a significant indirect effect through the theory of planned behavior as hypothesized (33).

Furthermore, when the model was applied to predict parental support behavior change, the effectiveness of the model decreased considerably. Intention and perceived behavioral control, indirectly through intention, were still significant predictors of each support behavior, but the effect sizes were reduced to explaining between 3-9% of support behavior change. This is very similar to meta-analysis results of the theory of planned behavior and physical activity change (49). The analysis of change results also showed smaller effects for parental support behaviors on change in child physical activity than the between-participant effects, and unfortunately, the theory of planned behavior variables did not have indirect effects of a meaningful magnitude on these changes. Thus, our model was not able to show whether the 1-4% explained variance in child physical activity changes from parental support was due to mediated changes in intention to support or perceived control over support.

Considering these findings for future family-level physical activity interventions, one helpful way to evaluate these differences may be to think of the between-participant results as the upper-bounds of the potential effects, while the analysis of change results represent the lower bounds of its effectiveness (60). The lowered results in the analysis of change may be partly from strong behavior stability coefficients (.74 - .87) across time; parents changed their behaviors very little across six-months. Nevertheless, analysis of change results are likely an important factor to consider for intervention implications because it maps to the aims of behavior

change within individuals (34). Clearly, the theory of planned behavior model had utility in understanding parental support behavior, child physical activity behavior, and support behavior change but its overall utility in understanding child physical activity change is yet to be fully determined.

Our second hypothesis concerned whether the distinction between affective and instrumental attitudes about support would contribute to the model. Based on a growing body of literature showing the importance of affective attitudes over instrumental attitudes (38, 61) we hypothesized that affective attitudes about support would be a stronger predictor of intention than instrumental attitudes. Our results clearly supported the two-component structure for attitudes across all three behaviors, but the effectiveness of the two-attitude constructs appeared to differ in the between-participant intention prediction and analysis-of-intention change prediction models. Generally, instrumental attitudes predicted the differences in intention between participants, yet affective attitudes predicted changes in intention across the sample over time. Regardless of these differences, both attitude constructs were extremely overshadowed by the role of perceived behavioral control over support. In both types of analyses (between-participant, analysis-of-change) and across all three support behaviors, perceived control was the dominant predictor with large effect sizes while attitudes vacillated between trivial to borderline meaningful effects (58, 62).

The results in these data differ from the prior research conducted by Rhodes et al. (32) because attitude was a much larger predictor of intention in that study. Still, when the overall indirect and direct effects of perceived behavioral control (which had a large direct effect on behavior in Rhodes et al. 2013) are considered, the results between these two studies clearly support the dominant importance of control when understanding parental support behaviors.

From an intervention perspective, past family-based initiatives have tended to focus on attitudes, awareness, or information about physical activity opportunities (10, 11) that do not directly address the socio-ecological control aspects faced by many parents (31, 63, 64). There is some evidence that increasing the self-regulatory abilities of parents for physical activity time with planning may hold utility (39) but many parents likely face real barriers for physical activity that may exceed an individual focus on self-regulation, as evidenced by the positive relationship between income and parental support even after controlling for the theory of planned behavior. Family composition may play an important role in control over support behaviors. This may include the role of fathers, single-parent households, multi vs. single- child households, other family members (e.g., grandparents, aunts) living in the household and requires future study. Furthermore, social support at a community collective (e.g., parent-shared transport, grandparent support), environmental support (e.g., community programs, availability and access), occupational support (e.g., employee consideration for family physical activity time), and policy support (low-cost and available physical activity programs) are all likely needed to improve supporting child physical activity (31, 63).

Finally, we explored whether the type of support moderated the findings. We hypothesized that logistical support and co-activity behaviors would show larger effects between perceived behavioral control and parental support behavior than encouragement behavior. This was based on the speculation that encouragement is less difficult than providing the time and resources that are needed for logistical support and co-activity; however, this hypothesis had mixed evidence. Encouragement had higher perceived control mean values than the other behaviors, and was more frequently enacted, and it was more dependent on perceived control than logistical support in our models. Furthermore, family income had a larger relationship with

perceived behavioral control and parental support behavior for logistical support compared to encouragement and co-activity. Still, no differences emerged during the analyses-of-change.

Interestingly, child age was linked to the social cognitive and subsequent behavioral aspects of co-activity more than the other supports. Still the effect size for this difference was small and all types of support were performed more for younger children. This may be due to a waning interest in family activity compared to peers as children approach adolescence, differences in the types of activities between parents and older children, or changes in parental motivation for supporting physical activity across time (19). Overall, however, all three support behaviors have importance to child physical activity (24-27) and this was demonstrated in medium-large correlations within our between-participant results and small effect sizes predicting the analysis of child physical activity change. Encouragement had the largest correlation with child physical activity compared to logistical support and co-activity behaviors. The result may be from the much larger breadth that encouragement entails (arguably this could encompass the other two support behaviors) (65). Furthermore, no obvious differences between the prediction of summer (time 2) and winter (time 3) support or physical activity was present, although logistical support was higher than co-activity during the winter. Logistical support may reflect the driving to and from facilities for indoor activities during winter while families may engage in co-activity outside as much as activities that require transportation during the Canadian summer. Interestingly, there was no significant variability between mother's perception of child physical activity across winter and summer, which is a contrary finding to studies of overall child physical activity (66) and BMI (67). Taken together from these data, the promotion of all three support behaviors appears prudent but encouragement behavior may be

the most critical/immediate support to focus on in interventions given its scope, and relationship with the child physical activity.

Despite the original findings of this paper, the results need to be considered within the context of its limitations. First, the study features a passive correlational design with considerable missing data between times 2 and 3 and several single-item indicators. Future experimental research with less participant loss to follow-up and potentially better measurement is needed to justify the proposed direction and size of the effects within the model. Second, the assessment of child physical activity via parent perception, may have social desirability bias, was not perfectly scale correspondent with the social cognitive measures (68), and it is unlikely to reflect the full range of physical activities performed by the child because parents are not present to observe their children for many hours per day. Future models that employ a more objective indicator (e.g., accelerometry) of child physical activity may be helpful over and above a proxy self-report measure. Our theory of planned behavior model also omitted the subjective norm construct and an examination of how norms may relate to parental support seems useful in future research. Finally, the sample used for this research showed generally strong representation of the Canadian population, but may not generalize to specific geographical locales, cultures, or fathers. Future research is needed to test the generalizability of these findings.

Figure Caption

Path Model Predicting Maternal Support of Child Physical Activity and Parent Perceived Child Physical Activity Across 12 Months. Note: * = $p < .01$; Top coefficient = encouragement; middle coefficient = logistical support; bottom coefficient = co-activity behavior.

References

1. Warburton DER, Charlesworth S, Ivey A, Nettlefold L, Bredin SSD**.** A systematic review of the evidence for Canada's physical activity guidelines for adults. *International Journal of Behavioral Nutrition and Physical Activity*. 2010;7:39.
2. Janssen I, LeBlanc AG**.** Systematic review of the health benefits of physical activity and fitness in school-aged children. *International Journal of Behavioral Nutrition and Physical Activity*. 2010;7: 40.
3. Malina RM**.** Physical activity and fitness: pathways from childhood to adulthood. *American Journal of Human Biology*. 2001;13(2):162-72.
4. Colley RC, Garriguet D, Janssen I, Craig C, Clarke J, Tremblay MS**.** Physical activity of Canadian children and youth: Accelerometer results from the 2007-2009 Canadian Health Measures Survey. In: StatisticsCanada, ed. *Health Reports*; 2011.
5. Troiano RP, Berrigan D, Dodd KW, Masse LC, Tilert T, McDowell M**.** Physical activity in the United States measured by accelerometer. *Medicine and Science in Sports and Exercise.* 2008;40:181-88.
6. Harris KC, Kuramoto LK, Schulzer M, Retallack JE**.** Effect of school-based physical activity interventions on body mass index in children: a meta-analysis. *Canadian Medical Association Journal*. 2009;180:719-26.
7. Van Sluijs EMF, McMinn AM, Griffin SJ**.** Effectiveness of interventions to promote physical activity in children and adolescents: Systematic review of controlled trials. *British Medical Journal*. 2007;335:703.
8. Gustafson S, Rhodes RE**.** Parental correlates of child and early adolescent physical activity: A review. *Sports Medicine*. 2006;36:79-97.
9. Clark MI, Spence JC, Holt N**.** In the shoes of young adolescent girls: Understanding physical activity experiences through interpretive description. *Qualitative Research in Sport and Exercise*. 2011;3:193-210.
10. O'Connor TM, Jago R, Baranowski T**.** Engaging parents to increase youth physical activity: A systematic review. *American Journal of Preventitive Medicine*. 2009;37:141-9.
11. Rhodes RE, Quinlan A**.** The family as a context for physical activity promotion. In: Beauchamp MR, Eys MA, eds. *Group Dynamics in Exercise and Sport Psychology*. second ed. New York: Routledge; 2014.
12. Baranowski T, Anderson C, Carmack C**.** Mediating variable framework in physical activity interventions: How are we doing? How might we do better? *American Journal of Preventive Medicine*. 1998;15:266-97.
13. Rhodes RE, Nigg CR**.** Advancing physical activity theory: A review and future directions. *Exercise and Sports Sciences Reviews*. 2011;39:113-9.
14. Loprinzi PD, Trost SG**.** Parental influences on physical activity behavior in preschool children. *Preventive Medicine*. 2010;50:129-33.
15. Berger I, O'Reilly N, Parent M, Seguin B, Hernandez T**.** Determinants of Sport Participation Among Canadian Adolescents. *Sport Management Review*. 2008;11:277-307.
16. Beets MW, Cardinal BJ, Alderman BL**.** Parental Social Support and the Physical Activity-Related Behaviors of Youth: A Review. *Health Education and Behavior*. 2010;37:621-44.

17. Biddle SJH, Atkin AJ, Cavill N, Foster C**.** Correlates of physical activity in youth: a review of quantitative systematic reviews. *International Review of Sport and Exercise Psychology*. 2011;4:24-49.
18. Craggs C, Corder K, van Sluijs EMF, Griffin SJ**.** Determinants of Change in Physical Activity in Children and Adolescents A Systematic Review. *American Journal of Preventitive Medicine*. 2011;40:645-58.
19. Edwardson CL, Gorely T**.** Parental influences on different types and intensities of physical activity in youth: A systematic review. *Psychology of Sport and Exercise*. 2010;11:522-35.
20. Mitchell J, Skouteris H, McCabe M, Ricciardelli LA, Milgrom J, Baur LA, et al. Physical activity in young children: a systematic review of parental influences. *Early Child Development and Care*. 2012;182:1411-37.
21. Pugliese J, Tinsley B**.** Parental socialization of child and adolescent physical activity: A meta-analysis. *Journal of Family Psychology*. 2007;21(3):331-43.
22. Trost SG, Loprinzi PD**.** Parental Influences on Physical Activity Behavior in Children and Adolescents: A Brief Review. *American Journal of Lifestyle Medicine*. 2011;5:171-81.
23. Yao CA, Rhodes RE**.** Parental correlates in child and adolescent physical activity: A meta-analysis. *International Journal of Behavioral Nutiriton and Physical Activity*. 2015;12:10.
24. Taylor WC, Baranowski T, Sallis JF**.** Family determinants of childhood physical activity: a social cognitive model. In: Dishman RK, ed. *Advances in Exercise Adherence*. Champaign, IL: Human Kinetics; 1994:319-42.
25. Davison KK, Li K, Baskin M, Cox T, Affuso O**.** Measuring parental support for children's physical activity in white and African American parents: the activity support scale for multiple groups (ACTS-MG). *Preventive Medicine*. 2011;52:39-43.
26. Dowda M, Pfeiffer KA, Brown WH, Mitchell JA, Byun W, Pate RR**.** Parental and Environmental Correlates of Physical Activity of Children Attending Preschool. *Archives of Pediatric and Adolescent Medicine*. 2011;165:939-44.
27. Zhao J, Settles BH**.** Environmental Correlates of Children's Physical Activity and Obesity. *American Journal of Health Behavior*. 2014;38:124-33.
28. Sallis JF, Prochaska JJ, Taylor WC**.** A review of correlates of physical activity of children and adolescents. *Medicine and Science in Sports and Exercise*. 2000;32:963-75.
29. Trost SG, Sallis JF, Pate RR, Freedson PS, Taylor WC, Dowda M**.** Evaluating a model of parental influence on youth physical activity. *American Journal of Preventitive Medicine*. 2003;25:277-82.
30. Welk GJ, Wood K, Morss G**.** Parental influences on physical activity in children: An exploration of potential mechanisms. *Pediatric Exercise Science*. 2003;15:19-33.
31. Davison KK, Nishi A, Kranz S, Wyckoff L, May JJ, Earle-Richardson GB, et al. Associations among social capital, parenting for active lifestyles, and youth physical activity in rural families living in upstate New York. *Social Science & Medicine*. 2013;75:1488-96.
32. Rhodes RE, Berry T, Craig CL, Faulkner G, Latimer-Cheung A, Spence JC, et al. Understanding parental support of child physical activity behavior. *American Journal of Health Behavior*. 2013;37(4):469-77.

33. Ajzen I**.** The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. 1991;50:179-211.
34. Rhodes RE, Quinlan A**.** Predictors of physical activity change in observational designs. *Sports Medicine*. in press.
35. Amireault S, Godin G, Vezina-Im LA**.** Determinants of physical activitymaintenance: a systematic review and meta-analyses. Health Psychology Review. 2013;7:55-91.
36. van Stralen MM, De Vries HD, Mudde AN, Bolman C, Lechner L**.** Determinants of initiation and maintenance of physical activity among older adults: A literature review. *Health Psychology Review*. 2009;3:147-207.
37. Nasuti G, Rhodes RE**.** Affective judgment and physical activity in youth: A review and meta-analysis. *Annals of Behavioral Medicine*. 2013;45(3):357-76.
38. Rhodes RE, Fiala B, Conner M**.** Affective judgments and physical activity: A review and meta-analysis. *Annals of Behavioral Medicine*. 2009;38:180-204.
39. 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.
40. Tremblay MS, Warburton DER, Janssen I, Paterson DH, Latimer AE, Rhodes RE**.** New Physical Activity Guidelines for Canadians. *Applied Physiology, Nutrition, and Metabolism*. 2011;36:36-46.
41. Ajzen I**.** Constructing a TPB questionnaire: Conceptual and methodological considerations. 2006.
42. Williams DM, Rhodes RE**.** The confounded self-efficacy construct: Review, conceptual analysis, and recommendations for future research. *Health Psychology Review*. 2014:1-16.
43. CDC**.** *Behavioral risk factor surveillance system survey questionnaire*. Atlanta. GA: U.S. Department of Health and Human Services; 2001.
44. Janssen I, Katzmarzyk PT, Boyce WF, Vereecken C, Mulvihill C, Roberts C, et al. Comparison of overweight and obesity prevalence in school-aged youth from 34 countries and their relationships with physical activity and dietary patterns. *Obesity Reviews*. 2005;6:123-32.
45. Godin G, Jobin J, Bouillon J**.** Assessment of leisure time exercise behavior by self-report: A concurrent validity study. *Canadian Journal of Public Health*. 1986;77:359-61.
46. Godin G, Shephard RJ**.** A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Science*. 1985;10:141-6.
47. Craig CL, Marshall AL, Sjostrom M, Bauman A, Booth M, Ainsworth B, et al. International physical activity questionnaire: 12-country reliability and validity. *Medicine and Science in Sports and Exercise*. 2003;35(8):1381-95.
48. Schumacker RE, Lomax RG**.** *A Beginner's Guide to Structural Equation Modeling*. Mahwah, NJ: Lawrence Erlbaum Associates; 1996.
49. McEachan RRC, Conner M, Taylor NJ, Lawton RJ**.** Prospective prediction of health-related behaviors with the theory of planned behavior: A meta-analysis. *Health Psychology Review*. 2011;5:97-144.
50. Hu L, Bentler PM**.** Cutoff criteria for fit indices in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*. 1999;6:1-55.

51. Statistics Canada**.** Population by sex and age group, by province and territory (Number, both sexes). CANSIM, table 051-0001; 2014.
52. Statistics Canada**.** 2006 Census. *Statistics Canada*; 2007.
53. Active Healthy Kids Canada**.** The active healthy kids Canada report card on physical activity for children and youth. 2009.
54. Tabachnick BG, Fidell LS**.** *Using multivariate statistics*. 3rd ed. New York: Harper Collins; 1996.
55. Allison PD**.** *Missing Data.* Thousand Oaks: Sage Publications; 2002.
56. Enders CK, Bandalos DL**.** The relative performance of full information maximum likelihood estimates for missing data in structural equation models. *Structural Equation Modeling*. 2001.
57. Allison PD**.** Handling Missing Data by Maximum Likelihood. *SAS Global Forum: Statistical and Data Analysis*, 2012. 1-21.
58. Cohen J**.** A power primer. *Psychological Bulletin*. 1992;112:155-9.
59. Anderson JC, Gerbing DW**.** Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*. 1988;103:411-23.
60. Williams DM, Dunsinger S, Jennings EG, Marcus BH**.** Does affective valence during and immediately following a 10-min walk predict concurrent and future physical activity? *Annals of Behavioral Medicine*. 2012;44:43-51.
61. Lawton R, Conner M, McEachan R**.** Desire or reason: predicting health behaviors from affective and cognitive attitudes. *Health Psychology*. 2009;28:56-65.
62. Ferguson CJ**.** An effect size primer: A guide for clinicians and researchers. *Proffesional Psychology: Research and Practice*. 2009;40:532-8.
63. Davison KK, Lawson HA, Coatsworth JD**.** The Family-Centered Action Model of Intervention Layout and Implementation (FAMILI) : The Example of Childhood Obesity. *Health Promotion Practice*. 2012;13:454-61.
64. Spence JC, Lee RE**.** Toward a comprehensive model of physical activity. *Psychology of Sport and Exercise*. 2003;4:7-24.
65. Davison KK, Mâsse LC, Timperio A, Frenn MD, Saunders J, Mendoza JA, et al. Physical activity parenting measurement and research: challenges, explanations, and solutions. *Childhood Obesity*. 2013;9:S103-S9.
66. Carson V, Spence JC**.** Seasonal variation in physical activity among children and adolescents: A review. *Pediatric Exercise Science*. 2010;22:81-92.
67. Baranowski T, O'Connor T, Johnston C, Hughes S, Moreno J, Chen T, et al. School year versus summer differences in child weight gain: A narrative review. *Childhood Obesity*. 2014;10:18-24.
68. Courneya KS**.** Predicting repeated behavior from intention: The issue of scale correspondence. *Journal of Applied Social Psychology*. 1994;24:580-94.

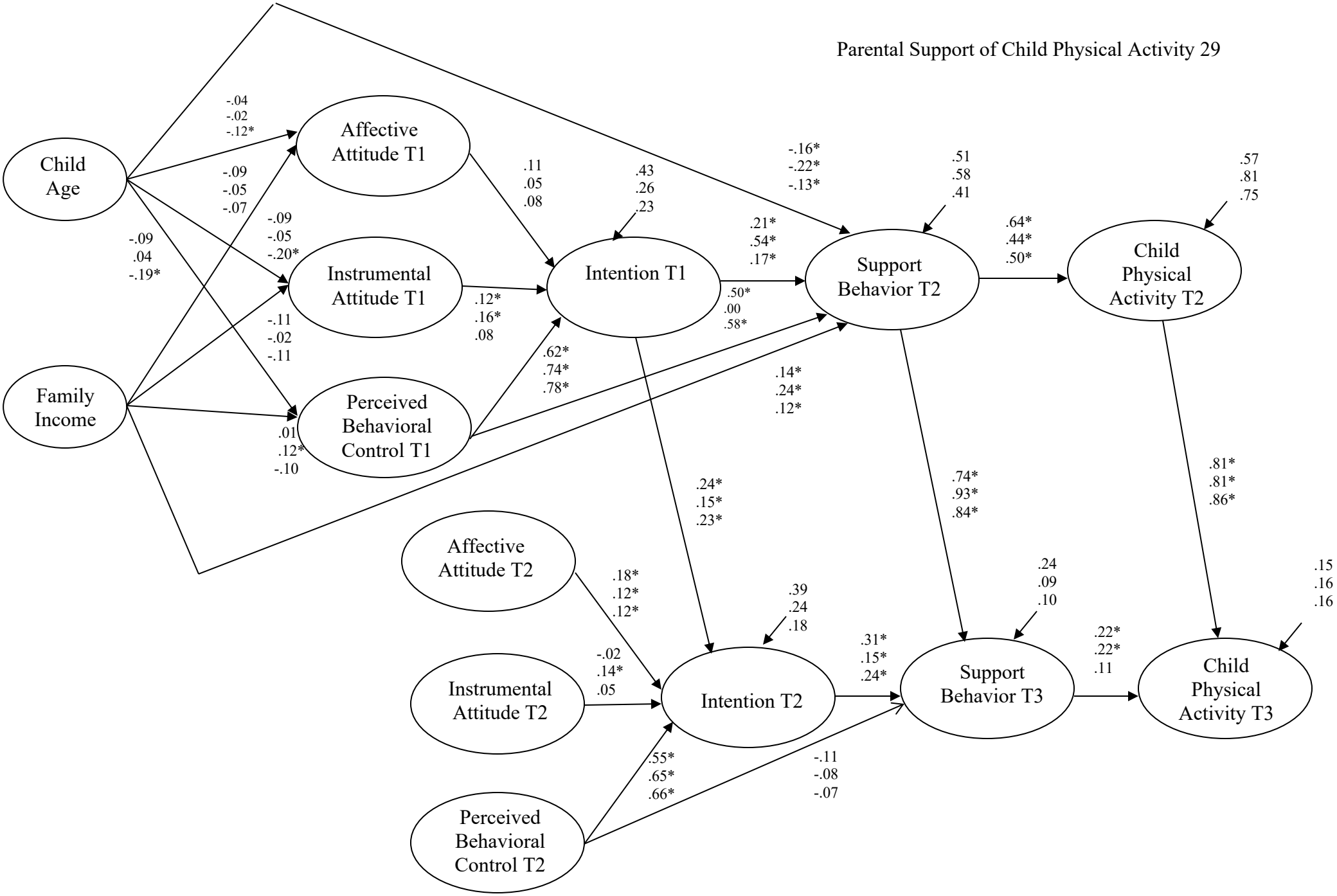
Child Age
Family Income
Affective Attitude T1
Instrumental Attitude T1
Perceived Behavioral Control T1
Intention T1
Support Behavior T2
Child Physical Activity T2
Affective Attitude T2
Instrumental Attitude T2
Perceived Behavioral Control T2
Intention T2
Support Behavior T3
Child Physical Activity T3
-.04 -.02 -.12*
-.09 -.05 -.07
-.09 .04 -.19*
-.09 -.05 -.20*
-.11 -.02 -.11
.01 .12* -.10
.11 .05 .08
.12* .16* .08
.62* .74* .78*
.43 .26 .23
-.16* -.22* -.13*
.51 .58 .41
.21* .54* .17*
.50* .00 .58*
.14* .24* .12*
.64* .44* .50*
.57 .81 .75
.24* .15* .23*
.74* .93* .84*
.81* .81* .86*
.18* .12* .12*
-.02 .14* .05
.39 .24 .18
.55* .65* .66*
-.11 -.08 -.07
.31* .15* .24*
.24 .09 .10
.22* .22* .11
.15 .16 .16

Table 1
Demographic, Health, and Physical Activity Profile

Characteristic	N = 1253
Province	
% Alberta	10.5
% British Columbia	12.7
% Manitoba	2.9
% New Brunswick	1.9
% Newfoundland/Labrador	1.4
% Nova Scotia	3.7
% Ontario	35.4
% P.E.I.	0.7
% Quebec	26.0
% Saskatchewan	4.8
Demographic Profile	
Number of Children Mean (SD)	1.64 (0.79)
Child Age Mean (SD)	7.11 (3.96)
% of female children	48.6
% Completed High School	96.0
% Completed University	31.5
% > $75,000 Household Income	54.0
% Currently Employed	69.0
% Urban Living	79.3
Parent Perceived Past Physical Activity	
% Children Meeting Canada's Guidelines	47.2

Table 2
Correlations among the Theory of Planned Behavior Constructs for Each Support Behavior and Child Physical Activity

	2	3	4	5	6	7	8	9	10	11	12	M	SD	Range
1. Instrumental Attitude T1														
Encouragement	.62*	.34*	.39*	.20*	.08	.35*	.34*	.18*	.20*	.26*	.08	4.00	1.00	1-5
Logistical Support	.67*	.40*	.46*	.24*	.10*	.45*	.46*	.33*	.36*	.25*	.09	3.69	1.09	1-5
Co-Activity	.64*	.37*	.42*	.25*	.15*	.41*	.36*	.31*	.33*	.28*	.18*	3.92	1.01	1-5
2. Affective Attitude T1														
Encouragement		.40*	.44*	.30*	.19*	.37*	.39*	.32*	.33*	.41*	.18*	3.76	1.01	1-5
Logistical Support		.40	.45*	.27*	.13*	.45*	.49*	.34*	.39*	.27*	.11	3.43	1.09	1-5
Co-Activity		.41*	.46*	.29*	.18*	.46*	.40*	.33*	.38*	.26*	.20*	3.83	0.98	1-5
3. Perceived Control T1														
Encouragement			.58*	.34*	.34*	.37*	.39*	.54*	.41*	.32*	.48*	4.08	0.87	1-5
Logistical Support			.72*	.33*	.10*	.32*	.30*	.58*	.47*	.36*	.09	3.58	1.12	1-5
Co-Activity			.71*	.46*	.21*	.29*	.31*	.59*	.56*	.49*	.26*	3.25	1.05	1-5
4. Intention T1														
Encouragement				.39*	.23*	.29*	.32*	.41*	.48*	.46*	.31*	3.92	0.96	1-5
Logistical Support				.41*	.15*	.38*	.36*	.53*	.55*	.46*	.18*	3.52	1.21	1-5
Co-Activity				.49*	.18*	.35*	.38*	.51*	.60*	.49*	.23*	3.30	1.13	1-5
5. Support Behavior T2														
Encouragement					.40*	.18*	.27*	.44*	.46*	.53*	.38*	3.85	0.95	1-5
Logistical Support					.28*	.32*	.30*	.47*	57*	.61*	.31*	2.98	1.13	1-5
Co-Activity					.34*	.27*	.32*	.56*	.59*	.63*	.31*	2.97	1.13	1-5
6. Parent Perceived Child Physical Activity Frequency T2														
Encouragement						.08	.11*	.38*	.27*	.35*	.59*	5.35	1.99	0-7
Logistical Support						.06	.04	.16*	.21*	.32*	.59*			0-7

Co-Activity	.09	.13*	.28*	.25*	.27*	.59*			0-7
7. Instrumental Attitude T2									
Encouragement		.64*	.27*	.32*	.24*	.13*	4.01	0.97	1-5
Logistical Support		.66*	.34*	.46*	.24*	.10	3.58	1.11	1-5
Co-Activity		.62*	.34*	.42*	.23*	.09	3.94	1.01	1-5
8. Affective Attitude T2									
Encouragement			.36*	.41*	.28*	.11*	3.75	1.03	1-5
Logistical Support			.39*	.48*	.26*	.06	3.40	1.14	1-5
Co-Activity			.41*	.48*	.32*	.12	3.81	1.04	1-5
9. Perceived Control T2									
Encouragement				.59*	.38*	.32*	4.17	0.82	1-5
Logistical Support				.72*	.41*	.21*	3.57	1.11	1-5
Co-Activity				.72*	.50*	.24*	3.45	1.03	1-5
10. Intention T2									
Encouragement					.44*	.29*	4.01	0.92	1-5
Logistical Support					.49*	.25*	3.52	1.23	1-5
Co-Activity					.55*	.23*	3.44	1.10	1-5
11. Support Behavior T3									
Encouragement						.44*	3.62	1.04	1-5
Logistical Support						.45*	2.91	1.19	1-5
Co-Activity						.34*	2.59	1.05	1-5
12. Parent Perceived Child Physical Activity Frequency T3							5.11	1.91	0-7

* $p < .01$; Correlations not corrected for the attenuation due to error.

Table 3. Structural Pathway Comparisons of the Three Support Behavior Models

Pathway	Encouragement/Co-Activity	Encouragement/Logistical	Co-Activity/Logistical
Between-Group χ^2 Difference Estimates T1-T2			
Age -> IA	13.06* ENC < CO-A	1.40	23.17* CO-A > LOGIS
Age -> AA	6.92* ENC < CO-A	0.13	9.67* CO-A > LOGIS
Age -> PBC	26.87* ENC < CO-A	26.87* ENC > LOGIS	60.85* CO-A > LOGIS
Income -> IA	0.47	4.57	8.15* CO-A > LOGIS
Income -> AA	0.56	1.44	0.20
Income -> PBC	14.20* ENC < CO-A	22.74* ENC < LOGIS	58.76* CO-A < LOGIS
IA -> INT	0.91	0.65	2.15
AA -> INT	0.01	0.45	0.65
PBC -> INT	4.61	2.85	2.65
Age ->Support	.00	7.89* ENC < LOGIS	5.34
Income -> Support	.12	13.54* ENC < LOGIS	8.08* CO-A < LOGIS
INT -> Support	0.71	13.07* ENC < LOGIS	8.95* CO-A < LOGIS
PBC -> Support	4.94	33.60* ENC > LOGIS	27.88* CO-A > LOGIS
Support -> PA	24.31* ENC > CO-A	38.45* ENC > LOGIS	0.95
Within-Group Change χ^2 Difference Estimates T2-T3			
IA -> INT	1.21	5.55	1.75
AA -> INT	0.21	0.15	0.05
PBC -> INT	0.31	0.05	0.45
INT -> Support	1.61	2.25	0.15
PBC -> Support	0.41	0.45	0.05
Support -> PA	2.41	0.05	3.15

Note: * = $p < .01$. IA = Instrumental Attitude; AA = Affective Attitude; PBC = Perceived Behavioral Control; INT = Intention; Support = Support Behavior; PA = Parent Perceived Child Physical Activity. ENC = Encouragement Support Behavior; LOGIS = Logistical Support Behavior; CO-A = Parent-Child Co-Activity Support Behavior.