Canadian Psychology / Psychologie canadienne
2012, Vol. 53, No. 4, 319–327

0708-5591/12/$12.00 DOI: 10.1037/a0030280

Testing and Integrating Self-Determination Theory and Self-Efficacy Theory in a Physical Activity Context

Shane N. Sweet and Michelle S. Fortier
University of Ottawa

Shaelyn M. Strachan
University of Manitoba

Chris M. Blanchard
Dalhousie University

Stemming from the need for theoretical integration, this study aimed at individually testing and integrating self-determination theory (SDT) and self-efficacy theory (SET) to predict physical activity. University students ($n = 225$) completed questionnaires measuring constructs from SDT and SET as well as the Godin Leisure Time Exercise Questionnaire. Using path analysis, individual SDT and SET models and 2 hypothesised integrated models were tested. The preferred integrated model was selected on the basis of model fit indices. The selected integrated model was then compared with the individual theoretical models by examining the number of theoretical links that remained constant and the explained variance in the variables. Results revealed that the individual and integrated models were supported. The second integration model, which had self-determined motivation and confidence in equal agenic roles, had better model fit, $\chi^2(7) = 28.87$, $p < .001$, comparative fit index = .95, root-mean-square error of approximation = .12, standardized root mean residual = .05, Akaike Information Criterion = 84.87, and was preferred over the individual theoretical models. Overall, integrating 2 motivational theories in physical activity research is feasible, and more studies are needed to enhance our understanding of physical activity participation.

Keywords: theory, exercise, motivation, confidence

Theory testing needs to increase in health behaviour research, including physical activity, because only 36% of health behaviour articles are theoretically driven (Painter, Borba, Hynes, Mays, & Glanz, 2008). In addition to individual theory testing, theory integration has been recently urged to advance the health behaviour literature, because integration will help reduce redundancy between theories and utilize each theory's strengths (Noar & Zimmerman, 2005). In the physical activity domain, motivational variables continue to consistently hold a strong link with this health behaviour (Pan et al., 2009). Because self-efficacy theory (SET; Bandura, 1997) and self-determination theory (SDT; Deci & Ryan, 2002) are two reputable motivational theories, this article purports to answer the current call for theory testing and integration using these theories in the context of physical activity.

Shane N. Sweet, School of Psychology, University of Ottawa; Michelle S. Fortier, School of Human Kinetics, University of Ottawa; Shaelyn M. Strachan, Faculty of Kinesiology and Recreation Management, University of Manitoba; and Chris M. Blanchard, Department of Medicine, Dalhousie University.

Shane N. Sweet is now at the School of Kinesiology and Health Studies, Queen's University.

This study was funded by the Social Sciences and Humanities Research Council of Canada (SSHRC). Shane N. Sweet was also supported by a doctoral fellowship from SSHRC. Chris M. Blanchard is funded by the Canada Research Chairs program.

Correspondence concerning this article should be addressed to Shane N. Sweet, School of Kinesiology and Health Studies, Queen's University, 28 Division Street, Kingston, Ontario K7L 3N6, Canada. E-mail: shane.sweet@queensu.ca

Self-Determination Theory

Self-determination theory (SDT; Deci & Ryan, 2002) has received increased attention in the physical activity domain, and consequently, its use is encouraged for physical activity research (Wilson, Mack, & Grattan, 2008). In SDT, multiple constructs—autonomy support, psychological needs and motivation—explain the physical activity behaviour change process. This section describes each SDT construct, starting with autonomy support to the types of motivation. First, autonomy support refers to one's perception of his or her social environment to the extent to which it provides choices and options, acknowledges one's opinion, and provides rationale when suggesting choices. Higher levels of autonomy support will positively influence one's psychological needs for autonomy, competence, and relatedness. *Autonomy* "refers to being the perceived origin or source of one's own behaviour," in this case physical activity (Deci & Ryan, 2002, p. 8). *Competence* is defined as "feeling effective in one's ongoing interactions with the social environment and experiencing opportunities to exercise and express one's capacities" (Deci & Ryan, 2002, p. 7) and *relatedness* as the desire to feel connected to others in the physical activity context (Deci & Ryan, 2000). Satisfaction of these three psychological needs lead to greater levels of self-determined motivation.

Three main types of motivation are found within SDT: amotivation, extrinsic, and intrinsic. These types are represented by

different regulations and are placed on a continuum: amotivation, external, introjected, identified, integrated, and intrinsic (Deci & Ryan, 2002). External and introjected regulations are aggregated to create non self-determined motivation, and the three latter forms of regulations represent self-determined motivation (Barbeau, Sweet, & Fortier, 2009). When self-determined, individuals partake in physical activity because they value the activity or derive pleasure and satisfaction from the activity. Non-self-determined motivation is expressed when individuals participate in physical activity to gain rewards or to avoid negative consequences or feelings of guilt. Finally, amotivation is defined by the lack of intention or willingness to engage in physical activity. Higher levels of self-determined motivation have been associated with greater physical activity participation (Barbeau et al., 2009; Edmunds, Ntoumanis, & Duda, 2006; Russell & Bray, 2009). Although SDT has been studied for physical activity, few studies have tested the entire SDT sequence (Edmunds et al., 2006). In addition, SDT experts have recommended that this theory be integrated with other theories to further explain physical activity (Hagger & Chatzisarantis, 2008). One such theory is self-efficacy theory.

Self-Efficacy Theory

Self-efficacy theory's (Bandura, 1997) main construct, self-efficacy, has been shown to be a strong and consistent predictor of physical activity (Pan et al., 2009). Self-efficacy is task specific, meaning that various forms of self-efficacy can exist for any given behaviour. Task, barrier, and scheduling self-efficacy respectively refer to one's confidence to participate in physical activity, overcome physical activity related barriers, and organise time and responsibilities around physical activity. The relationship among task (Millen & Bray, 2008; Strachan, Woodgate, Brawley, & Tse, 2005), barrier (Blanchard et al., 2007; Millen & Bray, 2008; Strachan et al., 2005), and scheduling (Strachan et al., 2005; Woodgate & Brawley, 2008) self-efficacy and physical activity has been established.

Outcome expectation, a second construct within SET, is described as the perceptions of positive and negative outcomes that result from participating in physical activity (Bandura, 1997). Theoretically, self-efficacy is hypothesised to have a direct influence on physical activity and an indirect relationship through outcome expectation. However, mixed findings have resulted in a hypothesis that outcome expectations might be a better predictor of self-efficacy rather than behaviour (see D. M. Williams, Anderson, & Winett, 2005). As a result, this article tested two different sequences: (1) self-efficacy → outcome expectation → physical activity, and (2) outcome expectation → self-efficacy → physical activity.

SDT and SET

There is currently a need for studies integrating theories related to health behaviours such as physical activity (Nigg, Allegrante, & Ory, 2002; Noar & Zimmerman, 2005). The goal of theoretical integration is not to pin one theory against another, but to incorporate constructs from two or more theories with the goal of better understanding the underlying mechanisms of behaviour change (Biddle, Hagger, Chatzisarantis, & Lippke, 2007).

SDT and SET are well aligned because they are based on the ideology that humans are agents of their actions. In short, agency, specifically regarding an internalist view, refers to the fact that humans possess complex internal structures that allow them to make choices regarding their actions (Sugarman & Sokol, 2012). Although SDT and SET have this same metatheoretical ideology, both theories have different views of agency. In SET, individuals act when they feel capable and able to attain the goal (i.e., self-efficacy drives the agent). Although SDT entertains the idea that feelings of capability/competence are important, SDT theorists believe that autonomy plays a larger role. If one feels autonomous in their actions, the likelihood of behaviour enactment and sustainability is greater, making self-determined motivation the main element of the agent. Because the agenic force in each of these theories differs, the role of competence/self-efficacy on behaviour is also different. In SDT, the concept of competence/self-efficacy is a more distal factor to behaviour because it is hypothesised to have a direct relationship with self-determined motivation rather than behaviour. In contrast, self-efficacy has a direct influence on behaviour, making it a more proximal factor in SET. This study will then help determine whether competence/self-efficacy should be more of a distal or proximal factor to physical activity.

Because of their common overarching framework, recent studies have begun combining constructs from SDT and SET and have revealed strong relationships between concepts from both theories. In one physical activity study, barrier self-efficacy was predicted by introjected, identified, and intrinsic types of regulations (Thøgersen-Ntoumani & Ntoumanis, 2006). In another study, barrier self-efficacy mediated the relationship between intrinsic motivation and physical activity (McNeill, Wyrwich, Brownson, Clark, & Kreuter, 2006). Finally, a study with adults with Type 2 diabetes demonstrated that self-determined motivation mediated the relationship between barrier self-efficacy and 12-month physical activity (Sweet et al., 2009). As evidenced by these studies, self-determined motivation and self-efficacy took different proximal and distal roles. As mentioned earlier, this study will help clarify what role (i.e., proximal vs. distal) these variables will play for physical activity participation.

Although these studies have demonstrated that constructs from both theories can work together in predicting physical activity, they have the common limitation of only testing one or two constructs from each theory rather than the entire theories. To integrate theories and to better understand the influence of the constructs, it is recommended that one test the individual theories first to help inform their integration (Noar & Zimmerman, 2005). With this initial step, we can then compare the individual theoretical models with the integrated one to determine whether there is a benefit to the integration.

Present Article

By following the methodological and analytical suggestions for theory comparison and integration outlined by Noar and Zimmerman (2005), the overall purpose of this article was to integrate SDT and SET into one comprehensive model. Specifically, each theory was tested separately (SDT & SET) and then integrated into one model. A priori models were designed for each theory, as well as integrated models, which were based on the theoretical assumptions of each theory as well as past research.

Hypothesised SDT Model

On the basis of SDT, autonomy support was set to relate to the psychological needs of autonomy, relatedness, and competence which in turn predicted the types of motivation. Self-determined motivation was expected to be significantly and positively associated with physical activity, while non-self-determined motivation was hypothesised to have a non-significant relationship with physical activity (Barbeau et al., 2009).

Hypothesised SET Models

Two models for SET were tested. The first model was the theoretical-consistent model in which self-efficacy had a direct relationship with physical activity and an indirect one, through outcome expectations. This second SET model was labelled the empirical model and tested whether outcome expectations had an indirect relationship with physical activity through self-efficacy.

Hypothesised SDT–SET Models

The next step involved combining the key variables from each model to create a more comprehensive model. The concepts of self-efficacy and perceived competence have been hypothesised to be similar (G. C. Williams, McGregor, et al., 2006); and a correlation (.50) between competence and self-efficacy has been documented (Fortier, Sweet, O'Sullivan, & Williams, 2007). Therefore, an exploratory factor analysis was conducted to determine whether these concepts were similar or different.

The integrated model was based on the theoretical tenets of both theories as well as past research. Two different hypothesised integrated models were tested. The links that remain constant across both integrated models are explained first, followed by the rationales for differences between the first and second integration models. First, autonomy support is hypothesised to predict autonomy, relatedness, and competence/self-efficacy, consistent with SDT. Second, and also in line with SDT, autonomy and relatedness are expected to be related to self-determined motivation. Third, the relationship between outcome expectations and competence/self-efficacy was determined by the results of the aforementioned SET models. Self-determined motivation is then expected to have a positive significant relationship with physical activity. The psychological needs are to be satisfied for motivational consequences to occur, following tenets of SDT. Therefore, we hypothesised that the needs of autonomy and relatedness will predict outcome expectations.

The difference between the two models lies in the relationship between the needs of autonomy and relatedness with competence/self-efficacy and competence/self-efficacy with physical activity. In the first integrated model, competence/self-efficacy takes on the role hypothesised in SDT (i.e., distal role) and expected to positively relate with self-determined motivation, similar to the other psychological needs. Because self-determination is hypothesised as the agenic force in this first model, it has the sole relationship with physical activity.

In the second model, competency/self-efficacy takes on an agenic role as depicted in SET (i.e., proximal role). Because of this agenic role, the need for autonomy and relatedness are hypothesised to be antecedents to competence/self-efficacy. Some support does exist in the SDT literature for this relationship. G. C. Williams, McGregor, et al. (2006) stated that autonomy prompts people to feel competent, supporting the proposed autonomy—competence relationship. In addition, Deci and Ryan (2000) mentioned that autonomy has a crucial role in forming self-determined behaviour. Specifically, they state that "autonomy occupies a unique position in the set of three needs: being able to satisfy the needs for competence . . . may be enough for controlled behaviour, but being able to satisfy the need for autonomy is essential for the goal-directed behaviour to be self-determined . . ." (p. 242). Therefore, the need for autonomy could be a precursor to the need of competence. Finally, autonomy and relatedness have also been hypothesised to come before competence/self-efficacy in the intervention model of the Physical Activity Counselling Trial (Fortier, Hogg, et al., 2007). The rationale for this relationship is that autonomy and relatedness should be developed first to then influence competence/self-efficacy. The proposed relationship between the needs of autonomy and relatedness with competence/self-efficacy has some theoretical support and, therefore, is the premise for this second hypothesised model. Finally, self-efficacy and self-determined motivation were set to have a link with physical activity as self-efficacy takes on an agenic role.

Method

Participants and Procedure

Undergraduate students enrolled in a first-year psychology course partook in a research participation program. Once registered to the program, they had the option of participating in multiple concurrently running research projects, in which this specific study was enlisted. After reading a description of the study, students who selected to participate in this study completed an online consent form and responded to an online questionnaire. These undergraduate university students' ($N = 225$) ages ranged from 18 to 49 years ($M = 20.7$, $SD = 4.58$), 65% were women, and 51% indicated that English was their mother tongue.

Measures

Physical activity. The Godin Leisure Time Exercise Questionnaire was used to evaluate self-reported physical activity (Godin & Shepard, 1985). Participants reported the number of days in a typical week that they engaged in physical activity for more than 20 min for light, moderate, and strenuous intensities. The frequencies were multiplied by 3, 5, and 9 for each intensity, respectively, and then summed to produce the total weekly leisure activity score. This questionnaire has compared favourably with other common self-report measures of physical activity (Jacobs, Ainsworth, Hartman, & Leon, 1993) and objective measures such as activity monitor and fitness tests (Kriska & Caspersen, 1997).

Autonomy support. Participants responded to six items of the Important Other Climate Questionnaire (G. C. Williams, Lynch, et al., 2006). Each item (e.g., "My exercise important other listened to how I would like to do things regarding my physical activity") was anchored on a 7-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (7). A mean of the six items was calculated. Cronbach's alphas for this measure and all others are reported in the Results section.

Basic psychological needs. The Psychological Need Satisfaction in Exercise Scale was used to assess the satisfaction of

the psychological needs for physical activity (Wilson, Rogers, Rodgers, & Wild, 2006). On a 6-point Likert scale ranging from 1 (*false*) to 6 (*true*), participants responded to 18 items, reflecting how they might feel when physically active. A mean was calculated for autonomy (6 items; "I feel free to exercise in my own way"), competence (6 items; "I feel that I am able to complete exercises that are personally challenging"), and relatedness (6 items; "I feel close to my exercise companions who appreciate how difficult exercise can be").

Motivation. Behavioural Regulation Exercise Questionnaire—2 (BREQ–2) was used to assess participants' motivation for physical activity (Markland & Tobin, 2004). Participants responded to 19 items, on a 5-point Likert scale ranging from 0 (*not true for me*) to 4 (*very true for me*), covering the types of motivational regulations on the self-determination continuum: amotivation (4 items), external regulation (4 items), introjected regulation (3 items), identified regulation (4 items), and intrinsic regulation (4 items). The integrated items currently missing from the BREQ–2 and proposed by Wilson, Rodgers, Loitz, and Scime (2006) were included in the scale (4 items). The mean score of each motivational regulation was calculated. As explained later in the data analysis section, the regulations were subjected to an exploratory factor analysis to determine whether they can be combined into two commonly used SDT constructs, namely, self-determined and non-self-determined motivation.

Task self-efficacy. Task self-efficacy was measured according to recommendations put forth by Bandura (1997). Specifically, participants rated their confidence to engage in physical activity for more than 20 min during their free time for at least 1, 2, 3, and up to 7 days per week. Answers were rated on a scale from 0% (*not at all confident*) to 100% (*completely confident*) and a mean percentage was calculated.

Barrier self-efficacy. Participants indicated the degree (0% to 100%) to which they were confident at overcoming 12 common barriers to physical activity (i.e., bad weather, did not have time). This scale was based on the studies of McAuley (1992) and Blanchard and colleagues (Blanchard, Rodgers, Courneya, Daub, & Knapik, 2002). A mean of the 12 items was calculated.

Scheduling self-efficacy. On a scale of 0% to 100%, participants indicated the degree to which they were confident in their abilities to schedule physical activity in their daily lives across five items (e.g., you will develop a plan to reach your exercise goals). Specific items for this scale were borrowed from past research assessing self-regulatory self-efficacy among a similar population (Strachan, Brawley, Spink, & Jung, 2009), which were in accordance with recommendations for measuring exercise-related self-efficacy (McAuley & Mihalko, 1998).

Outcome expectations. All 17 items (Rogers et al., 2004) were used to measure outcome expectations. The items consist of various outcomes/benefits of physical activity (e.g., less depressed, improve health/reduce disease risk). Participants rated their agreement with the impact of physical activity on each of these outcomes/benefits using a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). A mean of the 17 items was calculated.

Data analysis. The data-screening process followed recommendation and procedures outlined in the work of Tabachnick and Fidell (2007). Specifically, univariate and multivariate outliers, missing data, and normality of the variables were examined. Exploratory factor analysis was conducted to determine whether the motivational regulations from SDT emerged as different factors. Similarly, the self-efficacy measures were also verified with an exploratory factor analysis. On the basis of the results of these factor analyses, variables were combined as necessary.

For each model, five goodness-of-fit indices were examined: the chi-square goodness of fit, the comparative fit index (CFI), the root-mean-square error of approximation (RMSEA), the standardized root mean residual (SRMR), and the Akaike Information Criterion (AIC). Good model fit is indicated by a nonsignificant chi-square, a CFI of greater or equal to .90, an RMSEA of at least below .08, and an SRMR below .10 (preferably below .05; Kline, 2005). In addition, the smallest AIC between the models points to the better-fitting model (Kline, 2005). Next, paths that are nonmeaningful (standardised path coefficient $< .10$), nonsignificant, or both were removed from the respective models, and the modified model was recalculated.

As outlined in the introduction, one SDT, two SET and two integrated models were examined. The integrated models were based on the hypothesised links, but also from the results from the individual theoretical models just tested. Specifically, nonmeaningful relationships (i.e., standardized beta coefficients $< .10$) in individual theory models were not included in the integrated model. The best-fitting model from each hypothesised integrated model was compared with the individual theoretical models by looking at the variance explained in the motivational and physical activity variables and the number of supported hypothesised paths.

Results

Preliminary Analyses

Three univariate outliers were found for physical activity, and they were reduced to 1 unit higher than the next highest score. A square-root transformation was performed because physical activity was still slightly skewed (2.04) and kurtotic (4.46) even after removing the outliers. Data were found to be missing at random and imputed using the expectation maximization procedure with 25 iterations. A total of 11 multivariate outliers were found, and those participants were removed.

SDT Models

An exploratory factor analysis for motivation revealed two main factors (Factor 1: eigenvalue = 3.04, 50.70% of variance; Factor 2: eigenvalue = 1.35, 22.57% of variance), one for self-determined motivation and the other for non-self-determined motivation. Amotivation negatively loaded on the self-determined motivation factor and thus was removed from future analyses, as demonstrated by Barbeau et al. (2009). Good internal consistencies were found for autonomy support (.85), autonomy (.90), competence (.94), relatedness (.93), self-determined (.91), and non-self-determined motivation (.78). Errors were correlated between all three psychological needs in addition to correlations between the motivation variables. Because non-self-determined motivation did not have a meaningful relationship with physical activity, the link was removed. On the basis of modification indices, a relationship was added from autonomy support to self-determined motivation, which has been supported empirically (G. C. Williams, McGregor, et al., 2006). Once the SDT theoretical model was trimmed, the final model had good fit, $\chi^2(7) = 10.96$, $p = .14$, CFI = .99,

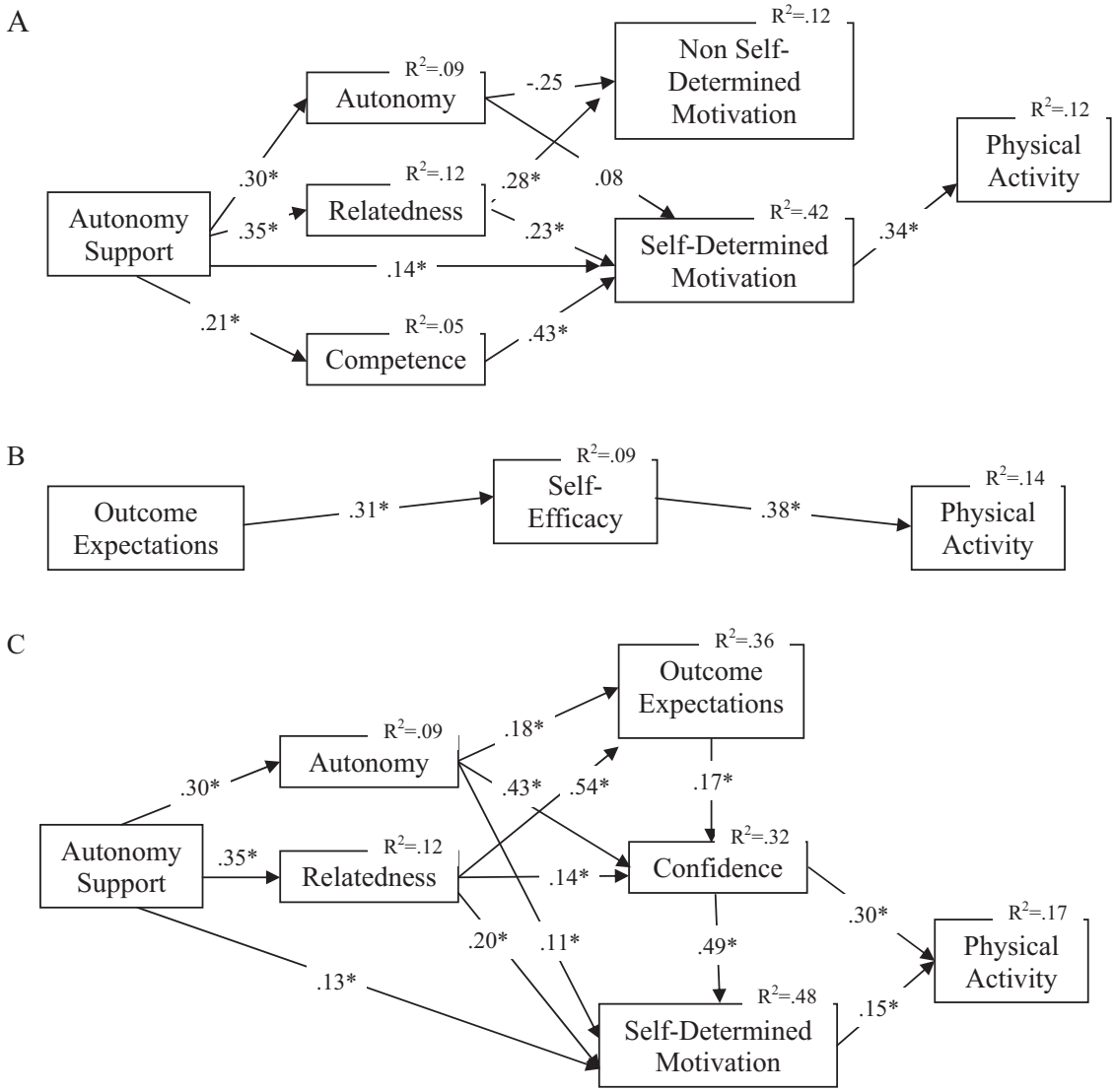

Figure 1. Final models for self-determination theory (A), self-efficacy theory (B), and the integration (C). Standardised coefficients are presented in each model. * $p < .05$.

RMSEA = .05, SRMR = .04, and is represented in Figure 1A. Because non-self-determined motivation did not have a meaningful relationship with physical activity, it was removed from the integrated models.

SET Models

All SET variables had acceptable Cronbach's alphas (task self-efficacy = .83; barriers self-efficacy = .76; scheduling self-efficacy = .87; outcome expectations = .86). An exploratory factor analysis with the aggregated scores of three types of self-efficacies was conducted prior to testing the models, and only one factor emerged (eigenvalue = 2.48, 61.95% of variance). Therefore, they were combined into an overall score. Outcome expectation did not have a significant relationship with physical activity ($\beta = .04$, $p = .56$) but did predict self-efficacy, which is consistent with the empirical model. Self-efficacy had a significant and positive relationship with physical activity levels (see Figure 1B).

SDT–SET Integration Models

Results from the exploratory factor analysis revealed that only one factor emerged between the different types of self-efficacy and perceived competence. By using the standardized scores of the aforementioned constructs, a new variable labelled *confidence* was created (Cronbach's alpha = .92). Table 1 displays the means, standard deviations and correlations between all variables in the integrated model. Keeping consistent with the SDT model, a relationship was added between autonomy support and self-determined motivation for both hypothesised models. The second hypothesised integrated model had better fit of the data, $\chi^2(7) = 28.87$, $p < .001$, CFI = .95, RMSEA = .12, SRMR = .05, AIC =

Table 1
Means, Standard Deviations and Correlations of Self-Determination Theory and Self-Efficacy Theory Variables and Physical Activity Included in the Integrated Model

Variable	*M* (*SD*)	1	2	3	4	5	6	7
1. Physical activity	69.73 (54.69)	—	.14*	.16*	.27*	.40*	.35*	.04
2. Autonomy support	4.89 (1.05)		—	.35*	.30*	.26*	.35*	.39*
3. Relatedness	4.34 (1.12)			—	.18*	.32*	.41*	.57*
4. Autonomy	5.18 (0.77)				—	.50*	.43*	.28*
5. Confidence	0.00 (0.78)					—	.64*	.37*
6. Self-determined motivation	2.93 (0.77)						—	.47*
7. Outcome expectations	3.85 (0.57)							—

Note. Correlations between physical activity and all variables are with the square root transformation of physical activity.
* $p < .05$.

84.87, $\Delta\chi^2 = 14.07$, $p < .001$, in comparison with the first integrated model, $\chi^2(7) = 42.94$, $p < .001$, CFI = .92, RMSEA = .15, SRMR = .06, AIC = 98.94. Of note, the second model also resulted in greater variance explained in confidence ($R^2 = .32$ vs. .13). As illustrated in Figure 1C, autonomy support predicted the needs for autonomy and relatedness and self-determined motivation as in the SDT model. Both autonomy and relatedness were related to confidence, outcome expectations, and self-determined motivation. Outcome expectations predicted confidence as in the SET model. Confidence and self-determined motivation predicted physical activity. In addition to explaining more variance in competence/self-efficacy/confidence, self-determined motivation, and physical activity (3%–5% increase) in the integrated model than in the individual models, all theoretical links found in the individual models remained significant in the integrated model, supporting the underlying theoretical assumptions in the integrated model. Therefore, the theoretical integration was demonstrated as being feasible.

Discussion

The overall purpose of this article was to address the call to integrate health behaviour theories. We tested and integrated SDT and SET in a physical activity context. The individual SDT and SET models and the integrated model were supported. Specifically, the second hypothesised integrated model was found to have the best model fit and favoured over the individual theoretical model. A highly innovative aspect of this article was the full test of SET and SDT, and their integration following the approach of Noar and Zimmerman (2005). Testing each theory separately, verifying construct similarity through factor analysis, and using the results from the theory testing to guide the integration are all strengths of this article. Finally, this was the first study to test and integrate both SDT and SET, using the Noar and Zimmerman approach.

SDT Model

The hypothesised theoretical SDT model was supported in this study. Specifically, autonomy support was associated with all three psychological needs, which is in line with SDT and previous research (Edmunds, Ntoumanis, & Duda, 2007). Autonomy support also had a significant relationship with self-determined motivation beyond the psychological needs. This direct effect has also been found for intrinsic motivation (Markland & Tobin, 2010). Relatedness and competence were linked to self-determined motivation, which confirms SDT and past studies (Edmunds et al., 2007). Although autonomy did have a significant correlation with self-determined motivation, this relationship did not translate in the model. It appears that when controlling for relatedness and competence, autonomy was no longer related to self-determined motivation. Similar to the findings of Wilson and Rogers (2008), the high correlation between autonomy and competence may have suppressed the relationship between autonomy and self-determined motivation. Therefore, more research in this field is needed to determine autonomy's influence on self-determined motivation. From a theoretical standpoint, this article adds to the current literature a strong test of the tenets of SDT in a physical activity context (Wilson et al., 2008). Because only a few studies have tested the autonomy support → psychological needs → motivational regulations → physical activity relationship (Edmunds et al., 2006), this study contributed to the literature by testing the SDT process in a physical activity context.

SET Models

Self-efficacy was significantly related to physical activity, which confirms theory and past research (Bandura, 1997; Strachan et al., 2005). The finding that outcome expectation was related to self-efficacy, but not physical activity, relates to studies in physical activity research (Carlson et al., 2001; Rovniak, Anderson, Winett, & Stephens, 2002) and to a review of outcome expectations and physical activity (D. M. Williams et al., 2005). In this review, the authors concluded that "decreasing expected aversive outcomes . . . and increasing expected positive outcomes of physical activity would increase self-efficacy for physical activity; therefore, it is possible that for physical activity, outcome expectancy operates to influence self-efficacy" (D. M. Williams et al., 2005, p. 73). The results of this study support this claim and answers the call by D. M. Williams et al. (2005), who suggested more research is necessary to help resolve the debate on the outcome expectation, self-efficacy, and physical activity relationship.

SDT–SET Integration Models

The second hypothesised integrated model, in which confidence was theorized to have an agenic role, had better model fit over the first hypothesised integrated model. With regard to the specific

hypothesised links, autonomy support retained its association with all variables, as in the SDT model. All the psychological needs predicted self-determined motivation in the integrated model, which confirms SDT.

The psychological needs of autonomy and relatedness also influenced both SET variables: confidence and outcome expectation. Therefore, confidence (i.e., competence/self-efficacy) held a greater agenic and more proximal role, which supports SET's conceptualisation of this construct. This result could be an indication that autonomy and relatedness can be fostered first because their satisfaction may aid to enhance feelings of confidence. Before firm conclusions can be made, longitudinal studies are needed to replicate such a model.

Without theoretical integration, the relationship between autonomy and relatedness with outcome expectations would have gone unnoticed. The relationship makes theoretical sense because the satisfaction of the psychological needs is theorized to be a precursor to human motivation (see basic needs theory within SDT; Deci & Ryan, 2002), and therefore can then be explained from an SDT standpoint. Empirically, Hagger, Chatzisarantis, and Harris (2006) revealed a relationship between the latent construct of psychological needs with attitudes, a concept similar to outcome expectations, in their exercise study integrating SDT and the theory of planned behaviour (Ajzen, 1985). Therefore, this relationship is supported both theoretically and empirically. On a practical note, interventions could foster a greater sense of autonomy and relatedness because satisfaction of these needs should help to bolster confidence and outcome expectations, as revealed by these results.

As for the relationship with physical activity, self-determined motivation and confidence were significant predictors of physical activity, which is consistent with SDT, SET, and the research highlighted earlier. Therefore, both self-determined motivation and confidence take on agenic roles and are more proximally related to physical activity. Although this conceptualisation of confidence (e.g., competence) does not line itself with SDT, the proximal relationship between confidence/competence with physical activity has been demonstrated empirically by SDT researchers (Fortier, Sweet, et al., 2007; G. C. Williams, McGregor, et al., 2006). Experimental and longitudinal research would do well to investigate whether confidence/competence could play a larger agenic and proximal role in SDT.

Strengths, Limitations, and Future Research

As previously mentioned, strong elements of this article were the testing and integration of two theories. Indeed, addressing multiple theories help to build more comprehensive interventions by utilizing the strengths of each theory. Findings revealed that autonomy support and the psychological needs are important constructs to foster because they were linked to both SET variables and self-determined motivation. Focusing on satisfying the three psychological needs by acting in an autonomy supportive fashion can help increase one's confidence, self-determined motivation, and perception of positive outcomes related to physical activity, which can then lead to greater physical activity levels. Recent interventions have begun incorporating these autonomy supportive elements in their counselling protocol (Fortier, Duda, Guérin, & Teixeira, 2012).

Despite the strengths of this article, limitations do exist. All measures, including physical activity, were self-reported and thus subject to social desirability. Studies using objective data (e.g., accelerometer) would enhance these findings. The cross-sectional data are this study's greatest limitation, because no causality or temporal relationships can be assumed. Studies replicating the integrated model with longitudinal data are essential to further test the integration of these theories. While the integrated models were favoured over the individual theory models, such conclusions warrant caution. This study tested two integrated models using a meditational approach. Future research could test different meditational or moderational models and attempt to determine which one may be optimal to understand physical activity behaviour.

Conclusion

Theory integration is now essential because we need to move to a multitheoretical understanding of physical activity. This new perspective would help us gain more insight into the mechanisms at play for physical activity behaviour change. Consequently, theory integration and its application to interventions should be the focus of future studies because it paints a clearer picture of the behaviour change process. As this article illustrates, theory integration is feasible, but more studies are still needed before firm conclusions can be made.

Résumé

Découlant du besoin d'intégration théorique, cette étude visait à vérifier séparément puis à intégrer la théorie de l'autodétermination (TAD) et la théorie de l'autoefficacité (TAE) dans le but de prédire l'activité physique. Des étudiants à l'université ($N = 225$) ont rempli des questionnaires mesurant les construits de la TAD et de la TAE ainsi que le Godin Leisure Time Exercise Questionnaire. Au moyen de l'analyse des pistes causales, des modèles distincts de TAD et de TAE ont été vérifiés ainsi que 2 modèles intégrés hypothétiques. Le modèle intégré préféré a été choisi en raison de la correspondance des indices du modèle. Le modèle intégré retenu a alors été comparé à chacun des modèles théoriques en déterminant le nombre de liens théoriques qui restaient constants et l'explication de l'écart entre les variables. Les résultats appuyaient les modèles distincts et intégrés. Le deuxième modèle intégré, qui accordait un rôle agénique équivalent à la motivation autodéterminée et à la confiance, présentait une meilleure correspondance, $\chi^2(7) = 28{,}87$, $p < 0{,}001$; Comparative Fit Index = 0,95, erreur quadratique moyenne de l'approximation = 0,12, indice de la racine du carré moyen d'erreur = 0,05, critère d'information d'Akaike = 84,87, et a été préféré aux modèles théoriques distincts. Dans l'ensemble, l'intégration des 2 théories de la motivation dans la recherche sur l'activité physique est faisable et il faudra poursuivre les recherches pour mieux comprendre la participation à l'activité physique.

Mots-clés : théorie, exercice, motivation, confiance.

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Received May 1, 2012
Revision received August 28, 2012
Accepted August 28, 2012 ■