Deepening the measurement of motivation in the physical activity domain: Introducing behavioural resolve

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Abstract

Objectives: Intention is theorized as the proximal determinant of behaviour in many leading theories and yet tests of its absolute predictive utility show discordance. While one line of research has been investigating constructs that may augment intention, another possibility may be to improve measurement. The purpose of this study was to compare a typical measure of exercise intention with a measure that attempts to deepen the motivational domain via considerations of contextual barriers and other competing goals (named behavioural resolve). Design: Two-week Prospective. Method: Participants were a random sample of university students who were subsequently randomized to groups who completed either measures of behavioural intention (n = 179) and behavioural resolve (n = 227) in relation to exercise and a 2-week follow-up of exercise behaviour. Results: Comparing the two measures showed that the behavioural resolve construct explained significantly more variance in exercise behaviour than the standard intention construct (q = .35). Further comparison of the two measures showed that absolute discordance with subsequent exercise behaviour was considerably lower with behavioural resolve (mean = -0.09) compared to behavioural intention (mean = -1.28). Conclusions: These findings indicate that at least some of the intention-behaviour gap may be from inadequate measurement of the motivational domain, and this can be partially rectified with shifting to a behavioural resolve measure.

Keywords: intention, physical activity, intention-behaviour, resolve, measurement

Introduction

Regular physical activity at a moderate to vigorous intensity has been linked to the reduction of over 25 chronic conditions including cardiovascular disease, type 2 diabetes, and several cancers (Warburton, Charlesworth, Ivey, Nettlefold, & Bredin, 2010). Unfortunately, it has been estimated that over 80% of adults fail to meet the minimum amount of physical activity to reap these benefits (Colley, et al., 2011; Troiano, et al., 2008). The need to promote physical activity is paramount. Understanding the basis for physical activity behaviours through sound behavioural theory should be helpful in order to inform interventions (Rhodes & Pfaeffli, 2010).

Many theories applied to physical activity include intention as the proximal antecedent to behavioural performance (Bandura, 2004; Fishbein, et al., 2001; Noar & Zimmerman, 2005). Specifically, intention is considered the hinge between other physical activity antecedents and behavioural performance and interventions that can increase intention are expected to subsequently produce behavioural changes (Ajzen & Fishbein, 2005). Correlational tests of this proposition via theory of planned behaviour (Symons Downs & Hausenblas, 2005), protection motivation theory (Plotnikoff & Trinh, 2010), and variants of social cognitive theory (Roberts, Maddison, Magnusson, & Prapavessis, 2010) and self-determination theory (Hagger & Chatzisarantis, 2009) have been supportive. Further, meta-analyses have placed the point estimate of the intention-behaviour relationship as $r = .50$ (Armitage & Conner, 2001; Hagger, Chatzisarantis, & Biddle, 2002; McEachan, Conner, Taylor, & Lawton, 2011; Symons Downs & Hausenblas, 2005), which situates it within the large effect size range (Cohen, 1992) and larger than any other known correlate of physical activity.

Despite the relative predictive value of intention in the physical activity domain, tests of its absolute predictive utility show discordance with behaviour. For example, a recent meta-

analytic examination of experimental changes in intention-behaviour relationships showed that medium-sized changes in intention resulted in trivial-sized changes in behaviour (r = .06) (Rhodes & Dickau, in press-a). Passive prospective designs that separate the intention-behaviour relationship into quadrants also demonstrate considerable discordance of intention and behaviour (Godin, Shephard, & Colantonio, 1986; Sheeran, 2002). These studies typically show that half of all people who intend to be active fail to reach these intentions (Rhodes, Plotnikoff, & Courneya, 2008). This line of enquiry has generated the term "intention-behaviour gap" and initiated some researchers to develop post-motivational (e.g., planning, self-regulation, implementation intention) models meant to bridge the intention-behaviour relationship (Gollwitzer, 1999; Schwarzer, 2008; Sniehotta, 2009). These models suggest that behavioural performance includes a motivational phase leading to intention followed by a volitional phase beyond intention.

While the extension of intention models with self-regulation and planning constructs has had evidence for its predictive utility (Gollwitzer & Sheeran, 2006; Schwarzer, 2008), there are other possibilities that may explain the intention-behaviour discrepancy. One possibility may be measurement. Pure measurement effects such as scale correspondence or duration between intention-behaviour assessments can attenuate the relationship (Courneya, 1994; Symons Downs & Hausenblas, 2005). Domain assessment of motivation, however, may be the most prominent reason for the intention-behaviour gap in physical activity. Intention has been defined as decisions to perform a behavioural action (i.e., behavioural direction) in its most modest conceptualization, to the effort and time one is willing to spend to perform a behaviour (i.e., behavioural intensity) in its most encompassing measurement domain consideration (Sheeran, 2002). We postulate that intention measurement has typically aligned with the decisional aspects

of the domain more than the intensity aspects and this may be part of the reason for the intention-behaviour gap.

For example, a recent systematic review on the moderators of the intention-behaviour relationship in the physical activity domain showed that intention strength, measured in this case as intention temporal stability, was the dominant explanation for intention-behaviour discordance (Rhodes & Dickau, in press-b). This suggests that inadequate measurement of initial physical activity motivation may account for much of the intention-behaviour gap. There is also evidence for this line of reasoning in studies that have used social cognitive constructs to predict unsuccessful intenders (i.e., those who intended to act but did not) from successful intenders (those who intended to act and did). In these studies (Rhodes, Courneya, & Jones, 2003; Rhodes & Plotnikoff, 2006; Rhodes, Plotnikoff, et al., 2008), affective attitude (i.e., enjoyment) and perceived behavioural control/self-efficacy predict intention-behaviour discordance, suggesting that some antecedent motivation may not be accounted for within intention.

The problem may reside in typical intention items that use “I intend to exercise” or “I plan to exercise” phraseology. While these statements provide direction (i.e., intention or no intention) and the scaling creates some assessment of strength (e.g., strongly agree to strongly disagree or frequency of days chosen to exercise), it seems plausible that the items neglect the context of how much effort will be expended to act on the intention across time. This type of assessment may be sufficient in simple or single act behaviours, but a repeated behaviour like physical activity (e.g., regular vigorous exercise) that requires one to organize large amounts of time, bring the body out of rest and undergo some pain/fatigue, use physical skills, arrange a suitable location, etc. requires considerable effort and attention that may not be assessed with these simple items. Indeed, the current problem with intention-behaviour discordance is from a

large number of false positives (i.e., intenders who never act), which supports the notion that simple “I intend” items may fail to measure the effort people are willing to expend on physical activity.

This critique has received some prior attention. For example, Ajzen and Fishbein (1977) originally considered a concept called conditional intention (e.g., intention in the face of potential situations). It is possible that conditional intentions could improve upon the predictive capability of ordinary intention items because the items force participants to consider situations that may affect behavioral engagement, but the employment of this type of measure has not been tried to our knowledge. Of course, the potential weakness of these conditional statements is that their accuracy is contingent on whether these simulated situations occur with enough frequency to reflect a person’s experiences (see also extended theorizing by Chatzisarantis et al., 2004).

Some researchers have examined poorly formed versus well-formed intentions in other behavioural domains and found that better intention formation can predict intention stability (Sheeran, 2002). This appears sound reasoning and parallels how planning (potentially an example of well-formed intentions) can out predict intention due to the detail of the intention formation. The problem with this approach is that it can obscure where motivation ends and volitional processes begin because one is not sure if planning is a post-motivational volitional process or a better indicator of motivation in the form of a well-formed intention. Probably the best use of contextualizing social cognition has been through the measurement of self-efficacy (Bandura, 1997), where confidence appraisals are made against the context of common barriers (e.g., time, fatigue). It seems conceivable that the use of these contextual prompts could also aid in understanding just how motivated an individual may be to perform physical activity.

Another area that may be neglected with simple "I intend" statements is intention within the context of other behavioural intentions or goals. Prior physical activity research has shown that intentions or goals to perform other behaviours is often negatively correlated with physical activity independent of physical activity intentions (Gebhardt & Maes, 1998; Gebhardt, Van Der Doef, & Maes, 1999; Presseau, Sniehotta, Francis, & Gebhardt, 2010; Rhodes & Blanchard, 2008, in press; Rhodes, Blanchard, & Bellows, 2008; Riediger & Freund, 2004). This line of enquiry follows research on the selection and optimization of a goal (Freund & Baltes, 2002). Specifically, priorities of intentions and the subsequent attention control placed on these intentions may be neglected in simple statements about intention to perform physical activity. It may be this level of detail that helps better differentiate intention strength.

Thus, the purpose of this study was to compare a typical measure of exercise intention with a measure that attempts to deepen the motivational domain assessment via considerations of contextual barriers, energy and other competing goals. To distinguish this measure from a quarter of a century of intention research we have named the construct *behavioural resolve*. It was hypothesized that behavioural resolve would be a better predictor of exercise behaviour than behavioural intention. However, the absolute value considerations were also of consideration in our comparison of the two measures. It was hypothesized that resolve would have a lower mean score and a smaller level of discordance with behaviour. The theorizing behind these hypotheses followed the logic that resolve would elicit far fewer false positives and have superior predictive efficacy than intention by contextualizing motivation within the frame of self-regulation, goal prioritization and energy demands. The resolve construct is similar to the concept of conditional intention in its attempt to ground motivation to real life circumstances, yet our focus on goal prioritization and energy level may sidestep much of the dependency on any particular situation.

Method

Participants and Procedure

Four hundred and sixty-five participants were recruited through classes at a university on the west coast of British Columbia, Canada during the spring 2011 semester (January to February). There are approximately 19,500 students at this University in ten different faculties ranging from Fine Arts to Sciences. The institution's human ethic's review board approved the protocol for the study and all participants provided informed consent.

A list of all classes at the university was used to randomly select classes, stratified by faculty and course year (i.e., 1-5), using a random number generator. The instructors of selected classes were contacted and asked if a research assistant could recruit participants from their class. 61.8% of instructors consented to involvement. With instructor approval, recruitment occurred at the start of class. Although total exposure to the survey was not possible to assess because we did not take formal attendance, the classes surveyed represented an upper bound total of N = 2,401. All students who wished to volunteer for the study were provided with an invitation and a web link to either the standard intention or new resolve measure questionnaire. These links were distributed at random, and coded without key words. Participants completed the survey online at their convenience.

Two weeks after the initial questionnaire, the 465 participants were contacted through contact information provided in the initial questionnaire and they were asked to complete a one-page follow-up questionnaire (behaviour measure only). The sample attrition rate was 14% (final (N = 406) and no significant differences ($p < .05$) were identified between those who responded to the follow-up and those who did not across demographic, motivation, and behaviour variables

or intensity condition. Thus, these missing data can be considered missing completely at random and were not used in the analyses.

Instruments

Physical activity in this study was defined as regular exercise at a vigorous intensity for at least 20 minutes per session. This is commensurate with the U.S. and Canadian guidelines of physical activity for public health in the vigorous intensity category (Canadian Society for Exercise Physiology, 2011; U.S. Department of Health and Human Services, 2010). Examples for vigorous activities included: jogging, running, rowing, jumping rope, tennis, fast bicycling, hockey and basketball. Participants were asked to use this definition when asked about the exercise questions.

Intention was measured with three items that are relatively standard to its assessment (Ajzen, 2006; Courneya, 1994; Rhodes, Blanchard, Matheson, & Coble, 2006). These included "I intend to exercise ___ times per week over the next two weeks," "My goal is to exercise ___ times per week over the next two weeks," and "I am determined to exercise ___ times per week over the next two weeks." The scaling for these items followed the continuous open format because this approach preserves scale correspondence with behaviour (Courneya, 1994; Courneya & McAuley, 1994) and represents a ratio-level of measurement over the dichotomous-graded (e.g., strongly agree-strongly disagree) format of scaling (Rhodes, Matheson, & Blanchard, 2006). This format is also a superior predictor of behaviour compared to the dichotomous graded format (Symons Downs & Hausenblas, 2005). Internal consistency was acceptable for the measure ($\alpha = .86$).

Resolve was measured with three items created for this study. The items reflected the concepts of motivation in the face of goal prioritization from prior research on the importance of

goal selection and its translation into goal optimization (Freund & Baltes, 2002) and the two most common physical activity barriers of time and fatigue among Canadians (Canadian Fitness and Lifestyle Research Institute, 2002). Similar to the intention items, continuous open scaling was employed. The items were: "I will make exercise the priority behaviour to achieve ___ times per week over the next two weeks," "Even if I have other demands on my time, I'll do my exercise at least ___ times per week over the next two weeks," and "Even if I am tired, I will do my exercise ____ times per week over the next two weeks." Internal consistency was acceptable for the measure ($\alpha = .91$).

Exercise behaviour was measured using the Godin Leisure Time Exercise Questionnaire (Godin, Jobin, & Bouillon, 1986; Godin & Shephard, 1985). The instrument contains three open ended questions covering the frequency of mild (e.g., easy walking), moderate (e.g., fast walking), and vigorous (e.g., jogging) exercise completed during free time and total duration in a typical week. The instrument was modified to assess a retrospective of the average of the last two weeks of exercise and the duration of exercise was described as at least 20 minutes per session, similar to our motivational items and public health guidelines. Only vigorous frequency was employed in this study, commensurate with the intensity framing of the motivation measures.

Analysis Plan

Our analysis plan included a basic mean comparison between the two measures, given that they are on the same metric of exercise frequency per week. This was followed by a comparison of the behavioural prediction capability of resolve and intention using a two-group structural equation modeling approach. For this analysis, the single item exercise behaviour measure was fixed with a zero error estimate to produce identical standardized effects to those in

OLS regression. This decision was predicated on OLS regression as the most common method of understanding the prediction of exercise behaviour in past literature with intention and the unit used in prior meta-analyses (McEachan, et al., 2011; Symons Downs & Hausenblas, 2005). The first indicator of each motivation construct (intention/resolve) was fixed to 1.0 in order to create a metric for the model, but all measurement error terms were left as freed coefficients in order to create latent variables of the two measures.

Finally, the absolute value discrepancy between motivation and behaviour was examined via mean comparison of the difference in behaviour scores compared to intention/resolve scores (i.e., a variable created for behaviour – intention/resolve) and the comparison between the two measures during categorization of motivation-behaviour correspondence. For this second analysis, motivation measures (i.e., intention and resolve) and the behaviour measure were dichotomized at 1) less than three bouts per week and 2) three or more bouts per week. This allows for a quadrant to assess the motivation-behaviour gap (see Rhodes, et al., 2003; Sheeran, 2002) where respondents are grouped either as nonintenders who subsequently are not active, nonintenders who result in being active, intenders who are inactive, or intenders who meet their initial goals. Chi-square analyses were performed on these quadrants across resolve and intention measures in order to evaluate whether the proportion of quadrant membership differed by the measure used.

Results

A total sample of n = 179 for standard intention measure group and n = 227 for the resolve measure group was used in the analyses. The mean age of participants was 22.93 years (SD = 7.32); 64.9% were female, and the mean year of studies was 2.70 (SD = 1.19). In terms of

vigorous exercise, the total sample reported a mean frequency of 2.69 bouts per week (SD = 2.19). Importantly, no differences in these descriptors were identified by measurement (intention/resolve) group ($p > .60$).

The mean difference between the intention and resolve measures can be found in Table 1. Intention was significantly ($p < .01$) higher than resolve and the effect size difference ($d = .58$) was in the medium-sized category, which identifies a noticeable difference (Cohen, 1992). Comparison of their predictive capability upon exercise behaviour is shown in Figure 1. The two-group structural equation model displayed moderate fit of these data [χ^2 (4) = 45.88; $p < .01$; NFI = .96, NNFI = .90; CFI = .97; RMSEA = .09; SRMR = .02]. Both measures displayed sound measurement with their three respective indicators (average variance extracted for intention = .79; average variance extracted for resolve = .81). Intention had a standardized effect on exercise behaviour of .49 (24% explained variance), while resolve had an effect on exercise behaviour of .71 (50% explained variance). Constraining this path across the two models to compare whether the effects were different yielded a significant chi-square of 120.88 (df = 1; $p < .01$) and a very meaningful difference in the comparative fit index (Δ CFI = .12), which suggest a noteworthy effect size (Cheung & Rensvold, 2002).

The critical comparisons between the two measures, however, are their discrepancies with exercise behaviour. The mean discrepancy with exercise behaviour (i.e., behaviour – motivation) can be found in Table 1. The discrepancy was significantly different between the two measures ($p < .01$) and the magnitude was in the medium effect size range ($d = .65$) denoting a meaningful difference (Cohen, 1992). Specifically, resolve had a lower absolute discrepancy with subsequent exercise behaviour that was very close to zero (mean = - 0.09) while intention was over one bout of exercise than actual exercise on average (mean = -1.28).

The second test of the discrepancy between the motivation measures and exercise behaviour using the action control framework also showed considerable asymmetry between the two measures [χ^2 (3) = 18.84; $p < .01$]. Table 2 outlines the more specific discrepancies around the motivation-behaviour gap. These results show that more people who reported resolve to exercise at least three times per week resulted in subsequent exercise at least three times per week when compared to those who intended to exercise three or more times per week [χ^2 (1) = 3.16; $p < .05$]. The difference between the two action control profiles accounted for 10% in successful translation of motivation into behaviour, which is within the meaningful effect size range (Cohen, 1992).

Discussion

The prominent intention-behaviour gap in physical activity and health behaviour research has prompted considerable interest in additional constructs that may augment this relationship. Still, the original measurement domain of behavioural motivation has seen negligible attention. It is possible that our measures of the intention construct do not assess the depth of motivation for a repeated behaviour like physical activity and this has resulted in at least some of this intention-behaviour discordance. In this study, we took up this challenge and examined a typical measure of exercise intention compared to a measure that attempts to deepen the motivational domain assessment via considerations of contextual barriers and other competing goals. To distinguish this measure from an established past of intention research – synonymous with motivation - we named the construct behavioural resolve.

First, it was hypothesized that behavioural resolve would be a better predictor of exercise behaviour than behavioural intention. The evidence from this initial comparison study had strong

support for this hypothesis. Both measures had an equal number of items (i.e., three each) and comparable internal consistency, yet behavioural resolve explained significantly more variance in exercise behaviour than intention. Of important note, the standard intention measure explained 24% of exercise behaviour, which is even better than meta-analytic results (Hagger, et al., 2002; McEachan, et al., 2011; Symons Downs & Hausenblas, 2005) and probably due to the continuous open scaling and adherence to scale correspondence employed in this study. Nevertheless, the behavioural resolve construct explained 50% of exercise behaviour and this difference was q = .35, which is in the medium effect size category (Cohen, 1992). Clearly, this is a noteworthy difference in the predictive capability of the two measures and worthy of future study.

It was theorized that the behavioural resolve construct takes conditional barriers and other competing interests into consideration and typical measures of intention often fail to do so (Presseau, et al., 2010; Presseau, Tait, Johnston, Francis, & Sniehotta, in press; Rhodes & Blanchard, 2008; Rhodes, Nasuti, & Fiala, in press). Thus, intention measures may be inflated (i.e., a hopeful proxy) because they do not create a condition or context for the motivation being assessed. We had indirect evidence for this conjecture with our mean comparison of the two measures. The standard intention measure was higher than the behavioural resolve measure and within a medium effect size difference of d = .58 (Cohen, 1992). In terms of absolute value, the average participant intended to exercise four times per week but only reported the resolve to exercise three times per week.

However, the absolute value considerations, when in the context of actual behaviour, were of key consideration in our comparison of the two measures. After all, the intention-behaviour gap was the main point of inertia for this study. It was hypothesized that resolve

would have a smaller level of discordance with behaviour as a result of this more realistic contextualization of exercise barriers and other competing goals. The theorizing behind these hypotheses followed the logic that resolve would elicit far fewer false positives than intention. We had strong support for this hypothesis. First, the absolute discordance with exercise behaviour was considerably lower with behavioural resolve compared to behavioural intention and the effect was in the medium effect size range of d = .65 (Cohen, 1992). In terms of absolute value, participants intended to exercise over a bout more than what they exercised, whereas the resolve construct showed almost no discrepancy between resolve and subsequent performance. When the relationship was divided into an action control frame (Rhodes, et al., 2003; Sheeran, 2002), participants were also 10% more successful in translating their resolve into behaviour than their intention. Both of these analyses show that behavioural resolve effectively shrinks the gap between motivation and subsequent behaviour.

These results are promising because they identify that at least some of the intention-behaviour gap is from inadequate measurement of the motivational domain, and this can be partially rectified with shifting to a behavioural resolve measure. Although the study results require replication, they are robust enough to warrant a recommendation that this construct be used in future theory of planned behaviour studies and other research that employs a summary motivation construct like intention. Again, the behavioural resolve construct is not to be considered an augmenting measure for intention, but a replacement for intention. The two measures are thought to be commensurate in their measurement domains, yet resolve is theorized to capture a deeper assessment of motivation strength. Future research in this area would benefit from examining whether planning/self regulation (Sniehotta, 2009) or habit/automaticity (Gardner, de Bruijn, & Lally, 2011) still predict behaviour after controlling for behavioural

resolve. These constructs represent very theoretically distinct variables from motivation, yet part of their predictive utility in past research may have come from the use of an intention measure that does not capture the motivational domain as well as behavioural resolve. Further, future analysis of intention stability and its predictive capability after controlling for behavioural resolve would be of interest. Intention stability has been considered the best assessment of motivation and it has been shown repeatedly to augment standard intention measures (Rhodes & Dickau, in press-b). It would be helpful to assess whether behavioural resolve negates this additional predictive effect because resolve is considered to tap the same measurement domain as intention stability through its assessment of context.

Despite the interesting findings of this study that prompt future directions in research, the limitations of the study need to be considered. The study uses a self-reported measure of exercise that could be improved upon in the future by incorporating direct assessments (i.e., accelerometry) or observation. The self-report measure is unlikely to directly affect these findings because of the randomized design, but replication would aid the veracity of these results. The primarily female undergraduate sample may also affect the generalizability of these results when considered in a broader population of adults or specialty populations. College students are clearly an important group for health promotion and this sample generalizes almost perfectly to the University populace (Tony Eder, e-mail communication, June 11, 2012), suggesting basic representation. Thus, the sampling is important in its own right. There is also little evidence to suggest that basic exercise motivation differences or barriers even exist across age, gender, or health condition (Canadian Fitness and Lifestyle Research Institute, 2002, 2009; Rhodes & Blanchard, 2007; Rhodes, Blanchard, & Blacklock, 2008). Still, replication of these

findings within different samples could only improve our understanding of these results so it is recommended.

In summary, the exercise intention-behaviour gap has prompted considerable interest in additional constructs that may augment this relationship, but little work had been performed to explore whether deepening the measurement domain of intention could reduce discordance with behaviour. In this study, we compared a typical measure of exercise intention to a measure that attempts to highlight contextual barriers and other competing goals. To distinguish this measure from an established past of intention research we named the construct *behavioural resolve*. The resolve construct clearly outperformed intention in behavioural prediction and reduced discordance with behaviour in terms of absolute value. These results are promising because they identify that at least some of the intention-behaviour gap is from inadequate measurement of the motivational domain. Future research in this area would benefit from examining whether the resolve measure could reduce the effect of planning/self regulation (Sniehotta, 2009), habit/automaticity (Gardner, et al., 2011), or intention stability upon behaviour. It is recommended that behavioural resolve receive continued research attention as a possible replacement of behavioural intention in the physical activity domain.

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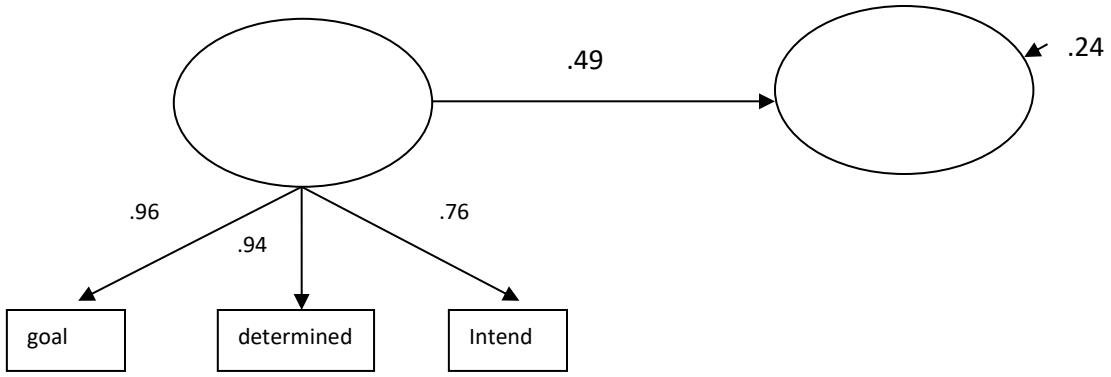
Figure 1.

Comparison of the predictive effect of behavioural intention and behavioural resolve upon exercise behaviour.


.49
.24
.96
.94
.76
goal
determined
Intend

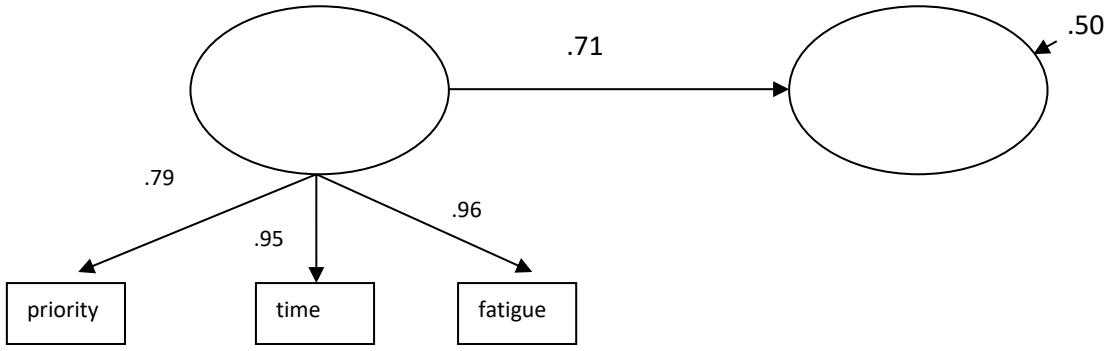

.71
.50
.79
.95
.96
priority
time
fatigue

Table 1

Mean Differences between Intention and resolve and their Discrepancy with Behaviour at Two weeks Prospective Assessment

	Mean (SD)		*t*	*d*
	Intention (n = 227)	Resolve (n = 179)		
Variable	3.92 (2.28)	2.77 (1.65)	6.00*	.58
Discrepancy with Behaviour	-1.28 (1.99)	-0.09 (1.66)	6.44*	.65

Note: * = $p < .01$

Table 2

Intention and Resolve by Action Control Profile Two-Weeks Later

	Intention (%) N = 131	Resolve (%) N = 132
Intenders who did not Exercise	47 (36%)	34 (26%)
Intenders who did Exercise	84 (64%)	98 (74%)

χ^2 (1) = 3.16, $p < .05$