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Mental toughness as a moderator of the intention–behaviour gap in the rehabilitation of knee pain

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ABSTRACT

Objectives: The purpose of this study was to investigate the role of mental toughness in maximising the effect of intentions to perform rehabilitative exercises on behaviour among a sample of people with knee pain.
Design: Cross-sectional survey, with a 2-week time-lagged assessment of exercise behaviour.
Methods: In total, 193 individuals (n_{female} = 107, n_{male} = 84) aged between 18 and 69 years (M = 30.79, SD = 9.39) participated, with 136 (70.5%) retained at both assessment points. At time 1, participants completed an online, multisection survey that encompassed measures of demographic details, severity of problems associated with the knee (e.g., pain, symptoms), past behaviour, mental toughness, and the theory of planned behaviour constructs (TPB; attitudes, subjective norms, perceived behavioural, intentions). Two weeks later, participants retrospectively reported their exercise behaviour for the past 14 days using an online survey.
Results: Moderated regression analyses indicated that mental toughness and its interaction with intention accounted for an additional 3% and 4% of the variance in exercise behaviour, respectively. Past behaviour, attitudes, and mental toughness all had direct effects on behaviour, alongside a meaningful interaction between intentions and mental toughness. Specifically, intentions had a stronger effect on exercise behaviour among those individuals high in mental toughness compared to those low in this personal resource.
Conclusions: The results of this study shed new light on the intention–behaviour gap by indicating that mental toughness increases the likelihood that intention is translated into action.

1. Introduction

Exercise—which includes general (e.g., walking) or disease-specific recommendations (e.g., muscle strengthening) regarding planned and structured bodily movements–is often prescribed for the prevention and rehabilitation of health conditions such as knee osteoarthritis,[1] cancer,[2] and stroke.[3] Meta-epidemiological evidence indicates that exercise is just as effective as drug therapy in the secondary prevention of coronary heart disease, treatment of heart failure and prevention of Type 2 diabetes.[4] Despite these well documented benefits of exercise for health and well-being, adherence to exercise recommendations is often poor and therefore compromises the effectiveness of treatment.[5] Thus, there is a need to better understand those factors that maximise peoples' engagement in exercise for rehabilitative and proactive purposes.

A diverse range of psychological, behavioural, environmental and social factors are important for the initiation and maintenance of health behaviours.[6] As theory-based interventions are more effective than atheoretical approaches,[7] considerable work has been devoted to developing and testing theoretical explanations for health behaviours. Social-cognitive theories have received widespread attention as a backdrop upon which to better understand individual-level determinants of behaviour. With regard to exercise, the theory of planned behaviour (TPB[8]) is one of the most widely adopted frameworks. Within the context of the TPB, one's intention to engage in the target behaviour is the primary determinant of whether or not one enacts the behaviour. Intention reflects the degree to which one is willing or ready to engage in the behaviour, and the amount of effort they plan to exert towards it. In turn, there are three distal cognitive and affective processes by which individuals form intentions to enact behaviour: attitudes refer to one's overall evaluation of the experiential (affective) aspects and outcomes (instrumental) of the behaviour; subjective norms reflect one's perceptions of social

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pressure from significant others to perform or not carry out the behaviour; and perceived behavioural control captures one's beliefs regarding the ease or difficulty with which the behaviour can be executed. The usefulness of the TPB for explaining a range of health behaviours including exercise is supported by meta-analytic evidence.[9]

Intentions are clearly important for exercise behaviour,[10] yet there is a noticeable 'gap' in that good intentions do not always translate into action.[11] Accordingly, considerable effort has been directed towards clarifying our understanding of variables that may moderate this association. There is a large body of work that has focused on post-intentional, self-regulatory strategies such as action and coping planning as a means by which to translate exercise intentions into behaviour.[12] Meta-analytic evidence indicates that these self-regulatory techniques are effective processes by which to translate physical activity intentions into behaviour.[13] Despite the benefits of these self-regulatory techniques for bridging the intention–behaviour gap, adherence to these strategies are modest.[14] An alternative yet complementary approach is to examine personal resources that capture individual differences in peoples' existing self-regulatory capacity.

Learning about individual differences that may foster or forestall purposeful processes designed to regulate thoughts, emotions and behaviours is likely to generate new insights into the intention–behaviour relation. Representing one such personal resource, mental toughness refers to a psychological capacity to attain and sustain one's self-referenced standards or objectives (e.g., goals, performance) despite varying degrees of situational demands.[15] Since perseverance is a key behavioural signature of mentally tough individuals,[16,17] there is reason to believe that this personal resource may foster the translation of intentions into behaviour. For example, research has shown that individuals who self-report high levels of mental toughness are more likely to produce higher levels of work performance, achieve more progress towards academic and social goals over a university semester, and withstand multiple and accumulating stressors over a 6-week period to succeed in their goal to pass a selection test.[15] Qualitative work indicates that mentally tough individuals identify, evaluate and re-assess goals,[18] and use long-term goals as a source of motivation.[19] Mental toughness is therefore one potentially important source of individuality that may underpin the effective regulation of thoughts, emotions and behaviours or the application of self-regulatory strategies in the pursuit of volitional behaviours like exercise rehabilitation.

The purpose of this study was to test whether or not mental toughness can bridge the intention–behaviour gap. As mental toughness is a personal resource that fosters behavioural perseverance on a task[17] and therefore facilitates positive outcomes for volitional behaviour,[15] it is expected to moderate the intention–behaviour association such that the strength of the relation will be greatest for people with high levels of mental toughness when compared with low levels of this personal resource. As the TPB is most pertinent when behaviour is volitional (i.e., driven by the will or intent of an individual to perform some action),[8] the focus in this study is on people with knee pain who have been prescribed rehabilitative exercises by a physiotherapist. Although the home-based rehabilitation exercises have been prescribed by a physiotherapist, it is up to individuals as to whether or not they execute these behaviours according to the professional advice. The TPB has been used extensively to study a wide variety of health behaviours, yet there have been few applications of this theoretical framework in people with knee pain. Thus, this study also provided an opportunity to test the robustness of key theoretical expectations of the TPB.

2. Methods

A total of 193 individuals (n_{female} = 107, n_{male} = 84) aged between 18 and 69 years (M = 30.79, SD = 9.39) participated in this study. Of the 193 participants who started the study, 136 (70.5%) completed both assessment points. People who met the following criteria were eligible to participate: in the past month, experienced (i) knee pain accompanied by morning stiffness lasting less than 30 min, (ii) crepitus on active movements, (iii) tenderness of the bony margins of the knee joint, and (iv) had consulted a physiotherapist about their knee pain and therefore had been provided with information regarding specific rehabilitative exercises. Participants were excluded if they had ever experienced a cardiac event (e.g., heart attack), had major bone or joint surgery (e.g., ACL), or a BMI greater than 35.[20]

Demographic data were collected by self-report and included age, gender, height, and weight. The subscales of pain, symptoms and function in activities in daily living from the Knee Injury and Osteoarthritis Outcome Score[21] provided an assessment of the severity of problems associated with the knee. Mental toughness was assessed using an established 8-item inventory.[15] Items designed to capture the theory of planned behaviour variables were developed in accordance with Azjen's[22] guidelines (see Appendix A of the Supplementary material). TPB instruments that have been developed in accordance with these guidelines have demonstrated excellent reliability and validity in previous research.[23,24] Consistent with the approach used in previous research,[25] exercise behaviour was assessed using a self-report measure in which participants indicated the frequency of rehabilitative exercises performed on average for 30 min over the past two weeks. In this study, rehabilitative exercises were defined as those activities that are intended to reduce the amount of pain experienced and/or strengthen those muscles that support the knee and surrounding areas with the view of preventing future knee pain.

All study procedures were approved by Curtin University's human research ethics committee. Participants were recruited and completed the study anonymously online via SocialSci (www.socialsci.com). Potential participants were recruited to this platform via online advertising, print media, and live recruitment where they signed up to take part in academic research in return for small points-based Amazon credits. The first section of the survey contained measures to ascertain an individual's eligibility for the study. Eligible and consenting participants subsequently provided demographic details and completed measures of the TPB, severity of problems associated with knee pain, mental toughness, and their intended exercise behaviour over the preceding 14 days. Two weeks later participants provided a self-report of their exercise behaviour over the preceding 14 days.

Data was initially screened for violations of assumptions of normality and outliers. First, to examine the possibility of an attrition bias, an analysis of variance (ANOVA) was performed to test for differences in the study variables at time 1 between those participants who completed the time 2 survey and those who did not respond, whereas a chi-square (χ^2) analysis was performed for gender. Second, a hierarchical multiple regression was performed to assess the effects of the distal predictors of intentions. Covariates were entered at Step 1 (demographic factors, severity of knee problems, and past behaviour), with attitudes, subjective norms and perceived behavioural control added at Step 2. Third, a moderated hierarchical multiple regression was performed to assess the importance of social-cognitive factors and mental toughness as determinants of exercise behaviour, while controlling for covariates. All independent variables were standardised prior to the regression analyses; gender was dummy coded (0 = female, 1 = male). Covariates were entered at Step 1; the TPB variables were