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Research report

The role of action control and action planning on fruit and vegetable consumption

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ABSTRACT

Globally, fruit and vegetable intake is lower than recommended despite being an important component to a healthy diet. Adopting or maintaining a sufficient amount of fruit and vegetables in one's diet may require not only motivation but also self-regulatory processes. Action control and action planning are two key volitional determinants that have been identified in the literature; however, it is not fully understood how these two factors operate between intention and behavior. Thus, the aim of the current study was to explore the roles of action control and action planning as mediators between intentions and dietary behavior. A longitudinal study with three points in time was conducted. Participants (N = 286) were undergraduate students and invited to participate in a health behavior survey. At baseline (Time 1), measures of intention and fruit and vegetable intake were assessed. Two weeks later (Time 2), action control and action planning were assessed as putative sequential mediators. At Time 3 (two weeks after Time 2), fruit and vegetable consumption was measured as the outcome. The results revealed action control and action planning to sequentially mediate between intention and subsequent fruit and vegetable intake, controlling for baseline behavior. Both self-regulatory constructs, action control and action planning, make a difference when moving from motivation to action. Our preliminary evidence, therefore, suggests that planning may be more proximal to fruit and vegetable intake than action control. Further research, however, needs to be undertaken to substantiate this conclusion.

Introduction

Despite accumulating evidence suggesting that nutritionally balanced diets rich in fruit and vegetables are associated with a reduced risk of chronic diseases including cardiovascular diseases and certain cancers (Boeing et al., 2012), globally fruit and vegetable consumption is lower than recommended. There are manifold reasons for consuming less than the minimum five daily servings of fruit and vegetables recommended by the World Health Organization (WHO) (Guilbert, 2003; Hall, Moore, Harper, & Lynch, 2009; Nebeling, Yaroch, Seymour, & Kimmons, 2007). However, to a large extent, unhealthy eating behavior is due to psychological reasons which can be of a motivational or volitional nature (Schwarzer, 2008; Shaikh, Yaroch, Nebeling, Yeh, & Resnicow, 2008). It is pivotal, therefore, for any prevention effort to be effective at promoting fruit and vegetable consumption to identify the relevant psychological determinants underpinning people's fruit and vegetable intake. Most studies that have explored such predictors of dietary behaviors have focused on motivational factors such as beliefs about capabilities and consequences, social influence, knowledge, habits, and goals (Guillaumie, Godin, & Vézina-Im, 2010). However, dietary behavior change requires not only motivation but also a volitional process that guides self-regulatory efforts (Adriaanse, Vinkers, De Ridder, Hox, & De Wit, 2011). Thus, there is a need for more theory-based research on volitional determinants of dietary behaviors.

Motivation to eat fruit and vegetables and the intention–behavior gap

Forming an intention has been regarded as a "watershed" between an initial goal setting phase (motivation) and a subsequent goal pursuit phase (volition), and the foundation of psychological theories of health behavior change such as the Health Action Process Approach (HAPA; Schwarzer, 2008). The terms

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motivation and goal setting refer to the preintentional phase, whereas the terms volition and goal pursuit pertain to the postintentional phase. Although the construct of intention is central in explaining dietary behavior change, its predictive value is limited (Sheeran, 2002). McEachan, Conner, Taylor, and Lawton (2011) reviewed 30 studies and found a mean correlation of r = .38 between intention and dietary behavior, accounting only for about 14% of the behavior variance. Thus, it is clear that people who are motivated to change their behavior often do not behave according to their intentions (Gollwitzer & Sheeran, 2006).

When trying to translate intentions into behavior, individuals are faced with various obstacles such as distractions, forgetting, or conflicting bad habits. If individuals are not equipped with the means to meet these obstacles, then motivation alone will not be sufficient to change people's dietary behaviors. To overcome this limitation, further constructs that operate in concert with intention are required to help close this intention–behavior gap (Gholami, Lange, Luszczynska, Knoll, & Schwarzer, 2013; Lhakhang, Godinho, Knoll, & Schwarzer, 2014). Action planning and action control are two volitional determinants that have been identified in the literature. It is not fully understood, however, how these two factors operate between intention and behavior.

Self-regulation: action planning and action control

Good intentions are more likely to be translated into action when people make plans to perform the desired behavior. Intentions foster planning, which in turn, facilitates behavior change. Several longitudinal studies have found that planning served as a mediator between intention and dietary behavior (e.g., Richert et al., 2010; Zhou, Gan, Knoll, & Schwarzer, 2013). Action planning pertains to a mental simulation of when, where, and how to act in line with the intention. It aims at creating new contingencies between (external) situational cues and behavioral responses (e.g., eating at least five portions of fruit and vegetable). Reviews have documented the mediating role of planning in health behavior change, including fruit and vegetable consumption (for an overview see Hagger & Luszczynska, 2014).

While action planning is a prospective strategy, that is, behavioral plans are made before the situation is encountered, action control is a concurrent self-regulatory strategy where the ongoing behavior is continuously evaluated with regard to a behavioral standard. Action control can comprise three facets: self-monitoring ("I consistently monitored when, where, and how to eat either fruit or vegetables"), awareness of standards ("I have always been aware of my prescribed intentions to consume enough fruit and vegetables"), and self-regulatory effort ("I took care to eat fruit and vegetables as much as I intended to") (Carver & Scheier, 2002; Sniehotta, Scholz, & Schwarzer, 2005). An empirical study testing the effects of action planning and action control on physical activity found action control to have the strongest direct effect on behavior compared to action planning and maintenance self-efficacy (Scholz, Keller, & Perren, 2009). Other studies have observed a mediation effect. For example, in a longitudinal study, action control was observed to serve as a mediator between action planning and exercise behavior (Sniehotta, Scholz et al., 2005). Changes in self-monitoring, a key component of action control, was also found to operate as a mediator in a dental flossing experiment (Schwarzer, Antoniuk, & Gholami, 2015). More specifically, studies investigating fruit and vegetable consumption have demonstrated that action control mediates the relation between dietary intentions and fruit and vegetable intake (Godinho, Alvarez, Lima, & Schwarzer, 2013). In addition, action control has been found to mediate between intervention conditions and fruit and vegetable consumption at follow up (Lange et al., 2013).

The current study

Although action planning and action control are two key volitional determinants of behavior, few studies have examined them jointly. Action control implies not only the recall of behavior but also the recall of intentions and previously formulated plans. Self-monitoring of the concurrent fruit and vegetable consumption makes people aware of their intentions, plans, and behaviors focusing on possible discrepancies between planning and action. Hence, action control can be specified either as a predictor or as an outcome of action planning or both. Accordingly, a parallel mediation effect could materialize or a mediator sequence may emerge with one of the two volitional constructs being first and the other second. The aim of the current study, therefore, was to identify the psychosocial determinants of fruit and vegetable intake in young adults and unpack the order of sequence of these factors.

Given the dearth of literature investigating simultaneously the role of action planning and action control, the focus of the current study was on these post-intentional constructs. Based on the HAPA, it is assumed that a mediation model starts with the intention, leading to action control and action planning, and finally affecting fruit and vegetable consumption. Three time points were selected to assess the sequence of effect of these variables: baseline behavior and intention at Time 1, action control and action planning at Time 2, and fruit and vegetable intake at Time 3. The following hypotheses were formulated:

1. Action control and action planning predict behavior, serving as two parallel mediators between the intention and fruit and vegetable intake.
2. Action control and action planning predict behavior, serving as two sequential mediators between the intention and fruit and vegetable intake.

Method

Participants

Three hundred and seven undergraduate students from a major university in China participated in the study. Participants who were vegan were excluded from the data analysis (n = 6), as were extreme outliers scoring above 3.29 SD of the grand mean (which equates to consuming 10 portions of fruit and vegetables per day; n = 15). In total, 286 participants completed the questionnaire at Time 1, with 156 participants completing all three assessment points. The age of participants ranged from 17 to 46 years (M = 23.64, SD = 4.44), with the majority of the sample comprising of women (n = 113, 72.4%).

Procedure

The study adopted a longitudinal design with three waves of data collection two weeks apart, and was approved by the University Human Research Ethics Committee. At baseline (Time 1), trained research assistants, prior to the commencement of class, invited undergraduate students from two courses to participate in a health behavior survey. Participants were provided with information about the purpose of the study and informed written consent was obtained. Consenting students were then asked to report on their intake of fruit and vegetables in the previous week as well as their intentions of future fruit and vegetable consumption. Two weeks later (Time 2), participants filled out a questionnaire on dietary action control and action planning. At Time 3 (two weeks after Time 2), participants completed a third questionnaire about their fruit and vegetable intake during the previous month. To thank participants for their efforts, those who completed all three questionnaires