



Predicting fruit and vegetable consumption in long-haul heavy goods vehicle drivers: Application of a multi-theory, dual-phase model and the contribution of past behaviour

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ARTICLE INFO

Article history:

Received 29 July 2017

Received in revised form

24 November 2017

Accepted 25 November 2017

Available online 28 November 2017

Keywords:

Integrative health model

Fruit and vegetable consumption

Long haul HGV drivers

Past behaviour

ABSTRACT

Fruit and vegetable intake is insufficient in industrialized nations and long-haul heavy goods vehicle (HGV) drivers are considered a particularly at-risk group. The aim of the current study was to test the effectiveness of a multi-theory, dual-phase model to predict fruit and vegetable consumption in Australian long-haul HGV drivers. A secondary aim was to examine the effect of past fruit and vegetable consumption on model paths. A prospective design with two waves of data collection spaced one week apart was adopted. Long-haul HGV drivers ($N = 212$) completed an initial survey containing theory-based measures of motivation (autonomous motivation, intention), social cognition (attitudes, subjective norms, perceived behavioural control), and volition (action planning, coping planning) for fruit and vegetable consumption. One week later, participants ($n = 84$) completed a self-report measure of fruit and vegetable intake over the previous week. A structural equation model revealed that autonomous motivation predicted intentions, mediated through attitudes and perceived behavioural control. It further revealed that perceived behavioural control, action planning, and intentions predicted fruit and vegetable intake, whereby the intention-behaviour relationship was moderated by coping planning. Inclusion of past behaviour attenuated the effects of these variables. The model identified the relative contribution of motivation, social cognition, and volitional components in predicting fruit and vegetable intake of HGV drivers. Consistent with previous research, inclusion of past fruit and vegetable consumption led to an attenuation of model effects, particularly the intention-behaviour relationship. Further investigation is needed to determine which elements of past behaviour exert most influence on future action.

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1. Introduction

Professional long-haul heavy goods vehicle (HGV) drivers are a population that is particularly at risk of chronic disease. Drivers spend long hours in a single, sedentary body posture, have poor sleep hygiene, and lack adequate nutrition (Apostolopolous, Sonmez, Shattell, Gonzales, & Fehrenbacher, 2013; Birdsey et al., 2015; Sieber et al., 2014). It is, therefore, not surprising that long-

haul HGV drivers have been documented to have obesity rates three times higher than the average population (Birdsey et al., 2015), with other studies reporting over 80% of the sample of HGV drivers being overweight or obese (Body Mass Index ≥ 25) (Hamilton, Vayro, & Schwarzer, 2015). In an attempt to address the health risks associated with long-haul driving and to understand the poor health habits of this at-risk group, studies have investigated the social and psychological beliefs that may guide long-haul drivers' eating decisions. For example, Vayro and Hamilton (2016) identified a number of salient behavioural, normative, and control beliefs that relate to HGV drivers' dietary decisions, which is consistent with previous research in other health behaviour contexts (Chan et al., 2015; Cowie & Hamilton, 2014; Hamilton, Kirkpatrick, Rebar, White, & Hagger, 2017; Hamilton, Peden,

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Pearson, & Hagger, 2016; Hamilton, White, Young, Hawkes, Starfelt & Leskeet al., 2012; Rowe et al., 2016; Tanna, Arbour-Nicitopoulos, Rhodes, Leo, & Bassett-Gunter, 2015), and eating behaviours in the general population (Sainsbury & Mullan, 2011; Spinks & Hamilton, 2015).

The elicitation of the salient beliefs provides a starting point for examining the multiple social psychological factors that likely underpin drivers' decisions to consume fruit and vegetables. The beliefs are components of broader behavioural theories derived from social psychology that may provide a framework for identifying the salient factors that relate to fruit and vegetable consumption, and the processes by which they affect behaviour. The purpose of the current study was to apply a behavioural model comprising constructs from multiple social cognitive and motivational theories to predict fruit and vegetable consumption in long-haul HGV drivers. The model incorporates multiple processes purported to underpin behaviour, including the factors that determine intentions to act, the mechanism by which the intentions are enacted, and how past participation in the behaviour may affect the determinants of subsequent behavioural enactment.

1.1. Multi-theory, dual phase model of fruit and vegetable consumption

Many theories applied to predict and understand health-promoting dietary behaviours have adopted a social cognitive perspective. According to the theories, engaging in dietary behaviours is a deliberative and intentional process (Ajzen, 1991, 2011) and intention is assumed to be the most proximal antecedent of behavioural engagement (Armitage & Conner, 2000; Conner & Norman, 2015). Prominent among intentional theories applied to dietary behaviour is the theory of planned behaviour (TPB; Ajzen, 1991; Emanuel, McCully, Gallagher, & Updegraff, 2012; Guillaumie, Godin, & Vézina-Im, 2010; Kothe, Mullan, & Butow, 2012). According to the TPB, intentions to perform a given behaviour in the future is a function of attitudes (i.e., the positive or negative evaluations of performing the behaviour), subjective norms (i.e., the perceived social expectations to perform the behaviour), and perceived behavioural control (i.e., the amount of control an individual believes he/she have over performing the behaviour). The TPB has been shown to account for up to 41% of the variance in intention and 35% of the variance in behaviour across a number of health related behaviours (Conner & Armitage, 1998; Godin & Kok, 1996; McDermott et al., 2015; Riebl et al., 2015; Shaikh, Yaroch, Nebeling, Yeh, & Resnicow, 2008) including up to 41% of the variance in intention and 45% of the variance in dietary behaviours (Collins & Mullan, 2011; Fila & Smith, 2006; Guillaumie et al., 2010; Hamilton, Daniels, White, Murray, & Walsh, 2011; Mullan, Wong, & Kothe, 2013; Mullan, Wong, Kothe, & Maccann, 2013; Spinks & Hamilton, 2016; White, Terry, Troup, Rempel, & Norman, 2010). The TPB will therefore form the basis of the current hypothesised model. However, research applying the TPB in health behaviour has identified substantive limitations (Sniehotta, Presseau, & Araújo-Soares, 2014). Sniehotta et al. (2014) has been particularly critical of the future use of the TPB as a sole behavioural change framework. Prominent limitations of the TPB include the lack of explicit detail on why certain beliefs are pursued (Hagger & Chatzisarantis, 2009), and the imperfect link between intentions and behaviour suggesting that while many individuals tend to make intentions to perform health behaviours, many do not act on them (Orbell & Sheeran, 1998). Integrating other theoretical perspectives has been recommended as a possibility to address these limitations and provide a more effective explanation of the determinants of dietary behaviour (Sniehotta et al., 2014). A number of theoreticians and researchers have proposed and tested

'extended' or integrated models of behaviour change such as the integrated behaviour change model (Hagger & Chatzisarantis, 2014), the integrated model of behavioural prediction (Fishbein & Yzer, 2003), and the trans-contextual model (Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003).

One perspective that may assist in explaining the origins of people's beliefs regarding health behaviours is self-determination theory (SDT). The theory is an organismic, macrotheory of human motivation which focuses on motivation quality rather than intensity (Deci & Ryan, 1985, 2008b). SDT identifies two broad types of motivation: autonomous and controlled. Autonomous motivation refers to the engagement in an activity because it is perceived to be self-endorsed, freely chosen, and absent from any external contingency. In contrast, controlled motivation reflects acting due to externally-referenced pressure or contingency, or to attain a reward or avoid punishment (Deci & Ryan, 2008a, 2008b). According to SDT, it is autonomous motivation that is the most likely form of motivation to be related to persistence on tasks and attainment of adaptive outcomes (e.g., positive affect, enjoyment, interest, well-being) because the reasons for participating are consistent with an individual's true autonomous self. In contrast, controlled motivation is related to persistence only as long as the controlling contingencies are present, and is not related to adaptive outcomes. Deci and Ryan (1985) explicitly align motivational forms from SDT with social cognitive factors that underpin behaviour. They suggest that individuals perceiving a given behaviour to be autonomously motivated are likely to strategically align their beliefs about performing the behaviour in future (e.g., attitudes, perceived behavioural control) with their motives. Research has shown that individuals classify their beliefs accordingly (Chatzisarantis, Hagger, Wang, & Thøgersen-Ntoumani, 2009; Hamilton, Cox, & White, 2012; McLachlan & Hagger, 2011; Wilson & Rodgers, 2004) and formed the basis of an integrated model in which autonomous beliefs served as an antecedent of the belief-based constructs from the TPB (Hagger & Chatzisarantis, 2009). The integrated TPB and SDT model provides a basis for the antecedent beliefs from the TPB and demonstrates the process by which generalized motives are enacted.

Research applying the model that integrate the TPB and SDT in health behaviour contexts has demonstrated significant effects of autonomous motivation on the belief-based constructs from the TPB (attitudes, subjective norms, and perceived behavioural control), significant effects of belief-based constructs on intentions, and a significant intention-behaviour relationship (Girelli, Hagger, Mallia, & Lucidi, 2016; Hagger, Trost, Keech, Chan, & Hamilton, 2017; Hamilton et al., 2012; Hamilton, Kirkpatrick, Rebar, & Hagger, 2017). Importantly, significant effects of autonomous motivation on behaviour were found mediated by the belief-based constructs from the TPB and intentions. An earlier meta-analysis examining the cumulative findings of research on the integrated TPB and SDT model in health-related behaviour context supported its predictions (Hagger & Chatzisarantis, 2009). Specifically, attitudes, subjective norms, and perceived behavioural control were able to mediate the relationship between autonomous motivation and intentions. These effects have been predominantly tested using prospective studies with follow-up periods ranging from one to five weeks (Hagger & Chatzisarantis, 2009). One study investigated the integration of SDT variables with the TPB in a three-wave prospective design in two university samples; one for diet and one for exercise behaviours (Hagger, Chatzisarantis, & Harris, 2006). Structural equation modelling supported the sequence of indirect effects in exercise behaviours and both the direct and indirect effects of the sequence in dieting behaviours. Given the effectiveness of the model in accounting for variance in the antecedents of intentions and health behaviour, the current investigation adopted a

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