



Effects of preparatory and action planning instructions on situation-specific and general fruit and snack intake



Gert-Jan de Bruijn ^{a,*}, Minh Hao Nguyen ^a, Ryan E. Rhodes ^b, Liesbeth van Osch ^c

^a University of Amsterdam, Amsterdam School of Communication Research ASCoR, Netherlands

^b University of Victoria, Behavioural Medicine Lab, Netherlands

^c Maastricht University/CAPHRI, Department of Health Education and Health Promotion, Netherlands

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ABSTRACT

Evidence to date suggests heterogeneity in the effects of implementation intentions on health behaviour, including diet. Additional variables and study designs may impact on their effectiveness. Preparatory action, such as making sure fruits are available for consumption, may be an important additional variable. Likewise, most implementation intention research has focused on changes in general intake, yet implementation intention instructions typically require participants to consider behaviour in specific situations. Little is known on how implementation intentions impact situation-specific intake. The present study sought to add to the evidence base by comparing (1) the effects of action planning instructions versus preparatory planning instructions on (2) both situation-specific (as formulated in the implementation intention instruction) and general intake of fruits and in-between meal snack intake frequency. Fruit intake was assessed in average pieces per day, whereas snacking intake was assessed as average frequency in days per week. Using non-probability sampling, 243 undergraduate students who intended to have a healthy diet were randomized to either a standard information control condition, an action planning condition, or a preparatory planning condition. Planning manipulations were based on previous work. Two weeks later, general and situation-specific intake was assessed again in 181 participants. Data were analysed using 2 (time) x 3 (conditions) analyses of variance. Results showed that both planning manipulations were successful in decreasing snack intake frequency in the specified situation, with larger effect sizes for the action planning condition than for the preparatory planning condition. No effects were found on general snack intake frequency or fruit intake. Future planning interventions should more explicitly compare changes in situational and general intake, as well as simultaneously assessed decreases in unhealthy intake and increases in healthy intake.

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A healthy diet, consisting of sufficient intake of fruits and vegetables and low to no intake of high-caloric snacking is thought to be protective against various noncommunicable diseases, including heart disease, overweight, and several cancers (Grimm et al., 2010; World Health Organization, 2003). Unfortunately, trend data across countries and across populations indicate that the majority of people do not meet recommendations for healthy dietary intake (Larson, Neumark-Sztainer, Hannan, & Story, 2007; Piernas & Popkin, 2010; World Health Organization, 2003). For adolescents and young adults, the transition to college life has substantial

negative effects on dietary patterns (Small, Bailey-Davis, Morgan, & Maggs, 2013). Although most students tend to have positive intentions to eat healthy, a large proportion of those intenders do not have sufficient healthy dietary intake (De Bruijn, 2010). As a result, these proposed health benefits are not obtained by a large amount of people, including college-aged students. Theories of human (health) behaviour are deemed relevant to develop effective persuasive strategies aiming to change these behaviours in a healthier direction (Prestwich, Sniehotta, et al., 2014). Most of these theories acknowledge intention as a primary determinant of behaviour, which is often described as a motivational state to reach a desired end goal (e.g., I intend to eat healthy). Despite the fact that a large proportion of people appear to hold positive intentions to eat sufficient fruits (De Bruijn, 2010; Jackson et al., 2005; Pietersma & Dijkstra, 2011) and to have a low intake of high-caloric snacks

* Corresponding author. Amsterdam School of Communication Research ASCoR, University of Amsterdam, Nieuwe Achtergracht 166, 1018 WV, Amsterdam, Netherlands.

E-mail address: g.j.debruijn@uva.nl (G.-J. de Bruijn).

(Verhoeven, Adriaanse, de Vet, Fennis, & de Ridder, 2014; Verhoeven, Adriaanse, de Vet, Fennis, & de Ridder, 2015), public health campaigns and persuasive messages emphasizing health benefits of a healthy diet have not been successful at initiating positive changes in dietary intake (Gallagher & Updegraff, 2012; Kothe, Mullan, & Butow, 2012; Snyder, 2007).

One of the potential reasons that these persuasive messages have been largely unsuccessful, is that health behaviours have a substantial automatic component, whereby behaviour is initiated not via intentional considerations, but rather without much conscious thought and deliberation (Gardner, 2014; Riet, Sijtsma, Dagevos, & DeBruijn, 2011; Sheeran, Gollwitzer, & Bargh, 2013). When behaviours are triggered habitually, intentions tend to become nonsignificant predictors of health behaviour (De Bruijn et al., 2007; De Bruijn, Kroeze, Oenema, & Brug, 2008; Gardner, Abraham, Lally, & de Bruijn, 2012; Triandis, 1977). Habits arise from repeated action in stable contexts (Aarts & Dijksterhuis, 2000; Ouellette & Wood, 1998; Verplanken & Wood, 2006; Wood & Neal, 2007) and, after sufficient pairing of context with the associated action, the specific context will automatically initiate the related action (De Wit, Corlett, Aitken, Dickinson, & Fletcher, 2009; Dijksterhuis & Aarts, 2010; Wood & Neal, 2007). Non-conscious processes are particularly problematic for traditional persuasive attempts stressing health benefits, as the automatic initiation of action prevents deliberating about the negative consequences of unhealthy intake or the consideration of healthier alternatives (Riet et al., 2011; Verplanken & Wood, 2006; Verplanken, Aarts, & Van Knippenberg, 1997). To change unhealthy habits, health behaviour change interventions should consider strategies that acknowledge automatic context-cueing as an alternative to merely providing health consequences (De Bruijn, 2010; De Bruijn & van den Putte, 2009; Gardner, 2014; Gollwitzer, 1999; Riet et al., 2011; Sheeran et al., 2013; Verhoeven et al., 2015; Verplanken & Wood, 2006). One useful strategy to consider in this regard is self-regulatory planning via implementation intentions.

Self-regulation strategies in general and implementation intentions specifically are central to the model of action phases, whereby people pursue goals via consecutive phases (Gollwitzer & Sheeran, 2006; Heckhausen & Gollwitzer, 1987). In the final two phases, people take actions to shield goal-directed behaviour from distractions (*actional phase*) and evaluate goal achievement (*post-actional*) after they have started to change their behaviour. In contrast, in the first two phases, people set goals and intentions based on desirability and feasibility of behaviour (*predecisional phase*), which has substantial overlap with the intention construct outlined above. In the second phase (*preactional phase*), people initiate actions that are relevant to goal attainment. Particularly for this preactional phase, people will benefit from implementation intentions, where an individual specifies the when, where, and how of goal-directed behaviour (Gollwitzer & Oettingen, 2010; Gollwitzer, 1999). The two psychological mechanisms underlying these positive effects of implementation intentions relate to a heightened activation of critical cues (the IF-component) and an increased strength of critical cue-response (the THEN-component) links (Gollwitzer & Sheeran, 2006). Via the formulation of implementation intentions, people are more sensitive to the specified cues (the IF-component, e.g. when I am feeling bored in the evening at home) (Verhoeven et al., 2014; Webb & Sheeran, 2004; Webb, Sheeran, & Luszczynska, 2009) and, when encountering that cue, the specified action (the THEN-component, e.g. I will eat an apple) will be initiated automatically (Gollwitzer & Sheeran, 2006; Sheeran et al., 2013). As such, the mechanisms via which implementation intentions affect behaviour are similar to how habits influence behaviour (Gollwitzer & Oettingen, 2010; Gollwitzer & Sheeran, 2006; Gollwitzer, 1999).

Meta-analytical evidence points to small-to-medium effects of implementation intention instructions on behavioural change (Adriaanse, Vinkers, DeRidder, Hox, & DeWit, 2011; Bélanger-Gravel, Godin, & Amireault, 2013; Gollwitzer & Sheeran, 2006). For instance, across a wide range of behaviours and samples, Gollwitzer and Sheeran (2006) showed that a medium effect on implementation intentions on goal achievement, relative to standard goal intentions. For diet specifically, Adriaanse et al. (2011) meta-analysed 23 studies and found that, for the inclusion of healthy food items in one's diet (e.g. fruits), formulating implementation intentions had a medium-sized effect ($d = 0.51$) relative to standard intention formulation (i.e. I intend to eat healthy) - the effect size for omitting unhealthy food items (e.g. snacks) in one's diet was found to be small ($d = 0.29$). Although these results thus point to an overall favourable effect of implementation intention on health-related action, several correlational and experimental studies that have failed to find significant effects of implementation intentions on fruit or snack intake (Adriaanse, de Ridder, & de Wit, 2009; De Bruijn, Wiedemann, & Rhodes, 2014; Jackson et al., 2005; De Nooijer, de Vet, Brug, & de Vries, 2006; Van Osch et al., 2009; De Vries, Kremers, Smeets, & Eijmael, 2008). This is corroborated by heterogeneity across studies used in meta-analyses on implementation intention effects (Adriaanse et al., 2011; Bélanger-Gravel et al., 2013), suggesting potential barriers to, or moderators of, implementation intention effects (Hagger et al., 2016).

One barrier that merits investigation is the issue of availability. Substantial evidence indicates that mere availability (of, for instance, fruits or condoms) is positively related to health-related action (such as fruit intake and condom use) (Kamphuis et al., 2006; Sheeran, Abraham, & Orbell, 1999; Van Empelen & Kok, 2008). Conversely, the absence of healthy options in one's immediate surroundings has a positive relationship with increased unhealthy dietary intake (Kamphuis et al., 2006), lack of physical activity (Duncan & Mummery, 2005; Mota, Almeida, Santos, & Ribeiro, 2005), and increased weight (Giskes, van Lenthe, Avendano-Pabon, & Brug, 2011; Mehta & Chang, 2008). Studies have further shown that availability of resources mediates intention-behaviour relationships (Bryan, Fisher, & Fisher, 2002; Van Empelen & Kok, 2006), because availability of resources allows one to take adequate preparatory actions in order to move from decision to action (Sheeran et al., 1999). Consequently, formulating implementation intentions that target preparatory actions to ascertain and/or facilitate availability may be a useful strategy to consider in implementation intention research (Rhodes & de Bruijn, 2013). Although the idea of preparatory actions as a self-regulatory intervention tool has received some recent attention in position papers (Rhodes & de Bruijn, 2013) and correlational studies (Bryan et al., 2002; Van Empelen & Kok, 2006), including studies regarding fruit intake (Van Osch et al., 2010), no experimental work exists that has explicitly compared the effectiveness of implementation intentions that are formulated towards consumption action (e.g. when I am tired, I will eat an apple instead of a chocolate bar) versus implementation intentions that are formulated towards preparatory actions (e.g. when I leave home to go to college, I will take an apple with me).

Nevertheless, some implicit notions of preparatory actions as an adjunct to action planning instructions have been made (Chapman, Armitage, & Norman, 2009), whilst other research has compared preparatory planning instructions relative to standard motivational information (Kellar & Abraham, 2005). For instance, Chapman et al. (2009) compared the effects of implementation intentions on fruit and vegetable intake, but instructed participants to not only consider if-then plans (e.g. if it is lunchtime at university, then I will eat an apple instead of crisps), but also to consider preparatory plans (e.g. planning what fruit and vegetables to buy, how you will

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