

RUNNING HEAD: Visualisation for increasing health intentions

Visualisation for increasing health intentions: Enhanced effects following a health message and when using a first-person perspective

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Abstract

The present research explored whether visualising engaging in a health behaviour resulted in increased intentions to engage in that behaviour, when combined with an informational health message. Further, the effects of the visual perspective (first-person vs. third-person) used to visualise the health behaviour were explored. In an online questionnaire study employing a 2 x 3 between-participants experimental design, participants ($N = 532$) read versus did not read an informational health message about the benefits of increasing fruit consumption, then visualised (from first-person vs. third-person perspective) versus did not visualise themselves increasing their fruit consumption. Intentions to increase fruit consumption were assessed, as were potential mediating variables. The results indicated that visualisation (irrespective of perspective) did not result in increased intentions when it was not combined with the health message. However, when participants had read the health message, visualisation resulted in significantly stronger intentions, and the first-person perspective was significantly more effective than the third-person perspective. The beneficial effect of visualisation, and the first-person perspective, on intentions was mediated by increased self-efficacy and action planning. Findings are discussed in relation to existing research on visualisation and perspective, and in terms of practical applications for health promotion efforts.

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Encouraging people to engage in health-protective behaviours remains a challenge. Despite widespread knowledge of the link between lifestyle factors and non-communicable diseases such as cancer, heart disease and Type-II Diabetes, vast numbers of the population fail to engage in health-protective behaviours. Around 19% of the adult US population smokes (CDC, 2011), only 32% consume the recommended portions of fruit, and 27% the recommended portions of vegetables, per day (CDC, 2009). Fifty percent of the population fail to meet the recommended guidelines on physical activity, and around 15% binge drinks on a regular basis (CDC, 2009). The western world is facing growing epidemics of obesity, diabetes, and cardiovascular disease, all of which could be preventable, to some degree, through lifestyle changes and the adoption of health-protective behaviours (WHO, 1990). As such, new and innovative methods of motivating people to adopt healthy lifestyle changes are essential.

Traditional health promotion interventions often consist of an informational message outlining the consequences of engaging in a health-related behaviour, and information on recommendations to avoid negative outcomes and/or achieve positive outcomes. For example, in a review of 122 interventions promoting physical activity and healthy eating, Michie, Abraham, Whittington, McAteer and Gupta (2009) found that 64 of these contained information about the consequences of engaging in a health-related behaviour and 37 contained information on the link between a behaviour and health. Repetition of key information is important in health promotion, but it is also important that alternative techniques of persuasion are utilized alongside informational messages to boost the motivational effects of these messages. Mentally simulating engaging in a desired health-protective behaviour, or visualising, might represent such a technique. In the present research we aim to explore whether

imagining the self engaging in a positive health behaviour can affect motivation to engage in that behaviour.

The effects of visualisation on subsequent performance have been explored extensively in the field of sports psychology, generally being found to have positive effects on performance (see Driskell, Copper & Moran, 1994 for a review). For example, visualisation of tennis serve has been shown to improve serve accuracy (Guillot, Genevois, Desliens, Saieb & Rogowski, 2012), and visualisation of volleyball resulted in subsequent improved scores (Roure, Collet, Deschaumes-Molinaro, Dittmar, Rada, Delhomme et al., 1998). Visualisation techniques have also been shown to be of benefit for improving performance of other tasks involving fine motor skills, such as the performance of laparoscopic cholecystectomy surgery (Arora, Aggarwal, Sirimanna, Moran, Grantcharov, Kneebone et al., 2011) and musical instrument playing (e.g., Ross, 1985). Further, visualisation has been successfully used in stroke rehabilitation patients. In this case motor imagery of an action is used where execution is not possible, and has been found to have beneficial effects on functionality following stroke (e.g., Page, Levine & Leonard, 2005), and even on muscle strength (Lebon, Collet, & Guillot, 2010).

In the context of health behaviours, the problem is less to do with correct performance of the behaviour, and more with motivation to engage in the behaviour. That is, in order for adult populations to benefit from the health benefits gleaned from eating a healthy diet and engaging in increased exercise, health promotion specialists focus on how to motivate individuals to engage in these behaviours. Therefore, the present research is concerned with whether visualisation can be used to boost motivation to engage in health behaviours, in particular when used in conjunction with the presentation of informational message traditionally used in health promotion

interventions.

Within the health domain, success in motivating action has been found with tasks that incorporate some form of visualisation technique. These studies had participants imagine a "future exercising self" (e.g., Ouellette, Hessling, Gibbons, Reis-Bergan & Gerard, 2005), mentally contrast a desired future health goal with present reality (e.g., Johanessen, Oettingen & Mayer, 2012), or visualise implementation intentions (Knäuper, McCollam, Rosen-Brown, Lacaille, Kelso & Roseman, 2011). In addition, Armitage and Reidy (2008) showed that visualising the process of donating blood was beneficial in increasing intentions to donate blood in the future, but visualising the outcome of donating blood was not. Using the theory of planned behaviour (TPB; Ajzen, 1991) as a framework for understanding the effects of process versus outcome simulations, Armitage and Reidy demonstrated that the beneficial effects of process simulations on intentions were mediated by increased subjective norms and perceived behavioural control with respect to donating blood. This study was informed by Pham and Taylor's (1999) finding that participants who imagined the process of doing well in an exam reported studying more and in addition obtained better grades than those who imagined the outcomes of doing well. Based on the finding that process simulations can be effective in increasing intentions to engage in a health-related behaviour, we employed a process-based visualisation task in the present research with the prediction that participants who visualised engaging in a health behaviour would report stronger intentions to engage in the visualised behaviour than those who did not visualise.

We also predicted that the effects of visualisation on intentions would be most pronounced when participants had first been presented with an informational health message about the benefits of engaging in the visualised behaviour. The informational

health message used in the present research primarily provided information about *why* they should engage in the health behaviour, whereas the visualisation task allowed participants to think about *how* they would engage in the behaviour. That is, imagining engaging in a behaviour should encourage individuals to anticipate how an event is going to take place and to form viable and effective plans of action (Pham & Taylor, 1999). We reasoned that participants would not be as motivated by thinking about *how* to engage in a behaviour if they had not previously been convinced as to *why* they should engage in the behaviour. Therefore, we predicted that visualisation would interact synergistically with the health message, such that the effects of visualisation on intentions would be stronger among those participants who were presented with an informational message about the behaviour prior to the visualisation task, compared to those who were not.

Moreover, we examined whether visualisation indeed provides participants with information on how to engage in the target behaviour via contributing to planning the imagined activity as suggested by Pham and Taylor (1999) who have found that participants who engaged in process simulations reported significantly more planning than those who engaged in outcome simulations. Armitage and Reidy (2008) did not assess planning, so the present research will contribute to previous work by examining whether the effects of health-related visualisation on intentions are mediated by planning, in addition to TPB variables such as subjective norms and perceived behavioural control (PBC), relative to a control group who do not visualise. Planning can be further categorized into action planning and coping planning (see, e.g., Sniehotta, Schwarzer, Scholz & Schüz, 2005). While action planning pertains to the when, where and how of intended action, coping planning includes the anticipation of barriers and devising of methods of overcoming them. In the present

study, we explored both action and coping planning as potential mediators. Self-efficacy was also tested as a potential mediator variable, as visualisation tasks have been shown to result in increased self-efficacy outside the health domain (Morin & Latham, 2000). Self-efficacy is similar to PBC but has been shown to be conceptually distinct from PBC in the context of dietary behaviours (Armitage & Connor, 2006).

Finally, the present research also aimed to explore the effects of perspective in visualisation. Any mental image of the self engaging in a behaviour can be undertaken using the first-person or third-person perspective (Nigro & Neisser, 1983). With the first-person perspective the individual sees things as they would if the event were actually taking place, whereas with the third-person perspective they see things as an observer would- they see themselves in the image as well as their surroundings. Although it has been shown that when visualising voting (Libby, Shaeffer, Eibach & Slemmer, 2007) and studying (Vasquez & Buehler, 2007), use of the third-person perspective results in stronger motivation to engage in the visualised behaviour, for health behaviours it has been shown that the first-person perspective is more effective, in particular for health behaviours that are more difficult to enact (Rennie, Harris & Webb, 2013). Which perspective is most effective is likely to depend on the type of task. The third-person perspective results in a more distanced, abstract picture that can induce the individual to see the visualised behaviour as more important (Vasquez & Buehler, 2007) and can encourage “wise” reasoning about the visualised event (Kross & Grossman, 2012). Thus, if the task demands wise reasoning and increased perceptions of importance, then the third-person perspective is likely to be more effective. For example, Kross, Ayduk and Mischel (2005) found that use of the third-person perspective when recalling anger-eliciting interpersonal experiences in the past resulted in less negative affect than when the first-person perspective was used. The

third-person perspective was shown to be more effective because it led participants to think about the reasons for the events rather than their experiences of them, which is clearly of benefit in a task where the aim is the successful processing of emotional experiences. However, use of the first-person perspective has been shown to result in a more detailed and realistic visualisation (McIsaac & Eich, 2002), and this should be of benefit when making behavioural plans. Because visualisation in the task that we chose to study was predicted to result in increased planning, it was predicted that use of the first-person perspective in visualisation would be most effective.

Present research

In summary, the present research aimed to explore whether a process-based visualisation task can increase intentions to engage in a health behaviour, in particular in conjunction with an informational health message. Theory of planned behaviour variables, self-efficacy, and planning were tested as potential mediators of the effects of visualisation. It was predicted that the effects of visualisation on intentions would be strongest when participants were exposed to both the message and the visualisation task. Further, the beneficial effects of the visualisation task were predicted to be most pronounced when a first-person perspective (vs. third-person perspective) was used. These predictions were tested in the context of fruit consumption. Increasing fruit consumption can contribute towards a healthy diet (WHO, 1990) and would allow individuals to become closer to meeting government recommendations for fruit and vegetable consumption (e.g., 2011 Dietary Guidelines for Americans). Although only 32% of US adults consume the recommended portions of fruit a day (CDC, 2009), incorporating extra portions of fruit into the diet may be possible, and so increasing fruit consumption was chosen as a suitable behaviour to target in the current study. The following four hypotheses were tested:

Hypothesis 1: Participants who engage in a visualisation task in which they imagine themselves increasing their fruit consumption will report stronger intentions to increase consumption than those who do not.

Hypothesis 2: The beneficial effects of visualisation on intentions will be most pronounced among participants who engage in visualisation from the first-person

perspective.

Hypothesis 3: The beneficial effect of visualisation (in particular first-person visualisation) on intentions will be most pronounced among participants who have first been presented with an informational health message outlining why it is important to eat fruit.

Hypothesis 4: The beneficial effect of visualisation (in particular first-person visualisation) on intentions will be mediated by increased planning, PBC, self-efficacy, attitudes and subjective norms.

Method

Participants and design. Participants were 532 US residents (329 female) aged 18 to 82 years ($M = 32.72$, $SD = 11.96$), who were recruited using Amazon Mechanical Turk, with a small cash incentive. The experiment employed a 2 (message vs. no message) x 3 (no visualisation vs. first-person perspective visualisation vs. third-person perspective visualisation) between-participants design. Participants were randomly allocated to condition.

Materials and procedure. Participants completed the questionnaire online, first starting with items assessing demographic information. Participants in the message condition were then presented with the health message, whereas those in the no-message condition went on to the next stage. Next, participants in visualisation conditions completed the visualisation task, whereas participants in the no-visualisation control proceeded directly to items assessing outcome variables.

Health message. The informational health message presented some general advantages of eating fruit, aiming to outline why it was important to eat fruit: “Trying to eat more fruit for just one day can help kick start lifelong habits that will help you gain real benefits for your health in the long-term”. It then presented a bullet-point list

of specific advantages enjoyed by people who eat plenty of fruit taken from websites of various health agencies (e.g., NHS, WHO). Participants were instructed to read the message carefully.

Visualisation task. Participants in visualisation conditions were told that they would be asked to imagine themselves engaging in a particular behaviour, but should first read instructions on exactly how to imagine it. Then they were given either first-person or third-person perspective instructions (from Libby et al., 2007) [third-person wording in parentheses]:

You should picture doing the action from a first-person [third-person] visual perspective. With the first-person [third-person] visual perspective you see the event from the visual perspective you [an observer] would have if the event were actually taking place. That is, you are looking out at your surroundings through your own eyes [you see yourself in the image, as well as your surroundings].

To ensure that the instructions were understood correctly, participants were also presented with a photographic image demonstrating the kind of image someone might have if they were to imagine themselves reading a book using the specified perspective. Participants were then told the action they were to visualise: “Eating 3 extra portions of fruit tomorrow (on top of what you would usually eat)”. This behaviour was chosen for the imagery task as it would help participants approach recommended levels of fruit consumption in the US and to keep with previous research exploring visualization in the domain of healthy eating (e.g., Rennie, Harris & Webb, 2009). Directly after the visualisation task, as a perspective manipulation check, participants in visualisation conditions were asked what percentage of the time they used the required perspective when visualising themselves enacting the target

behaviour; responses were given on a 6-point scale ranging from 0% to 100% in increments of 20%.

Outcome variable. The principle outcome variable was behavioural intentions. Intentions are the proximal determinants of behaviour in the TPB and have been demonstrated to reliably predict health behaviour (for a review, see Godin & Kok, 1996). Two items assessed intentions; participants were asked to indicate on a 7-point scale how likely it was that they would eat 3 extra portions of fruit the following day (1: *very unlikely* to 7: *very likely*), and the extent to which they agreed with the statement “I intend to eat 3 extra portions of fruit tomorrow” (1: *strongly disagree* to 7: *strongly agree*; $r = .88, p < .001$).

Potential mediating variables. Potential mediating variables included action planning, coping planning, self-efficacy and TPB variables (attitudes, social norms, PBC). Attitudes were assessed by asking participants the extent to which their eating 3 extra portions of fruit the following day would be unpleasant to pleasant, unenjoyable to enjoyable, harmful to beneficial and worthless to valuable ($\alpha = .86$). Social norms were assessed by asking participants the extent to which they agreed with the statements “People who are important to me think I should eat 3 extra portions of fruit tomorrow” and “People who are important to me would approve of my eating 3 extra portions of fruit tomorrow” (1: *strongly disagree* to 7: *strongly agree*; $r = .45, p < .001$). Perceived behavioural control (PBC) was assessed by asking participants the extent to which they agreed (1: *strongly disagree* to 7: *strongly agree*) with the statement “I feel in complete control of whether I eat 3 extra portions of fruit tomorrow” and they were then asked to rate how much control they felt over whether they ate 3 extra portions of fruit the following day (1: *no control at all* to 7: *complete control*, $r = .85, p < .001$). To assess self-efficacy, participants were asked to indicate

the extent to which they agreed with the statement “If I wanted to, I would not have problems eating 3 extra portions of fruit tomorrow” (1: *strongly disagree* to 7: *strongly agree*) and how confident they were that they could eat 3 extra portions of fruit the following day (1: *completely unconfident* to 7: *completely confident*; $r = .61$, $p < .001$). All the above items were devised following the guidelines of Ajzen (2002).

Action planning was assessed using 3 items that asked participants to indicate the extent to which they agreed with statements that they had a detailed plan regarding when, where and how to eat 3 extra portions of fruit the following day (1: *strongly disagree* to 7: *strongly agree*; $\alpha = .94$). Coping planning was assessed using 5 items that asked the extent to which participants agreed that they had detailed plans regarding what to do if something interfered with their plans, how to cope with possible setbacks, what to do in difficult situations in order to act in accordance with their intentions, which good opportunities for action to take, and when they should pay extra attention in order to prevent lapses (1: *strongly disagree* to 7: *strongly agree*; $\alpha = .94$). All planning items were taken from Sniehotta et al. (2005).

Results

Six participants in the visualisation conditions reported not using the required perspective and so were excluded from the analyses. Participant age did not vary across the conditions, $F(5, 526) = 1.01$, *ns*, and was not significantly associated with intentions, $r = -.03$, *ns*. Similarly, number of men and women was comparable across conditions, $\chi^2(5) = 6.18$, *ns*, and participant sex was not associated with intentions, $F(1, 530) < 1$. Therefore, these variables were not controlled for in the analyses reported below and are not discussed further.

Hypotheses 1 and 2

A two-way ANOVA was conducted with visualization condition and message condition as the independent variables and intentions as the dependent variable. There was a significant effect of visualisation condition on intentions, $F(2, 526) = 5.18, p < .01, \eta_p^2 = .02$ (see Table 1 for descriptive statistics for the effects of visualisation condition and message on intentions and potential mediating variables). Planned contrasts revealed that participants who visualised engaging in the target behaviour (irrespective of perspective) reported significantly higher intentions ($M = 3.94, SD = 1.71$) than those who did not ($M = 3.49, SD = 1.79, p < .01, d = .26$), but of those who did visualise, there was no significant difference in intentions between the first-person and third-person perspective conditions. This analysis also revealed a significant effect of message on intentions, $F(1, 526) = 6.84, p < .01, \eta_p^2 = .01$, with intentions higher among those participants who had been presented with the health message ($M = 4.00, SD = 1.76$) compared to those who had not been presented with a message ($M = 3.60, SD = 1.72$).

Hypothesis 3

The main effect of visualisation condition on intentions was qualified by a significant message x visualisation condition interaction, $F(2, 526) = 7.92, p < .001, \eta_p^2 = .03$. To explore this further, analyses were carried out to investigate the effects of visualisation condition in the two message conditions separately. This showed that within the no message condition, there was no significant effect of visualisation condition on intentions, $F(2, 272) < 1, ns$, but there was a significant effect of visualisation condition within the message condition, $F(2, 254) = 12.12, p < .001, d = .62$. Planned contrasts within the message condition showed that participants who visualised engaging in the target behaviour (irrespective of perspective used) reported significantly higher intentions ($M = 4.26, SD = 1.70$) than those who did not visualise

($M = 3.42$, $SD = 1.78$; $p < .001$, $d = .49$) and of those who did visualise, those who used the first-person perspective reported significantly higher intentions ($M = 4.68$, $SD = 1.61$) than those who used the third-person perspective ($M = 3.85$, $SD = 1.69$; $p < .001$, $d = .51$) (see Figure 1).

The above analyses address the first three hypotheses regarding the effects of visualisation condition on intentions and reveal that intentions were stronger following visualisation, and strongest when a first-person perspective visualisation was used, but only among participants who were first presented with the informational health message.

Hypothesis 4

To test Hypothesis 4 and explore what might explain the observed effects, bootstrapping mediation analyses were carried out separately for the two message conditions, examining the effects of visualisation condition in the presence and absence of a health message. The potential mediating variables in the model included action planning, coping planning and TPB variables and self-efficacy.

The bootstrapping mediation analyses were conducted using methods described by Preacher, Rucker and Hayes (2007) for estimating direct and indirect effects, with multiple mediators operating in parallel. Intentions to eat more fruit were the dependent variable and visualisation condition the predictor variable. As visualisation condition is a categorical variable of more than 2 levels, a macro for multicategorical predictor variables was used, which generates omnibus effects for the indirect effect of the predictor on the dependent variable via specified mediators, in addition to planned contrasts. Thus, Contrast 1 tested the difference between those who visualised (irrespective of perspective) and those who did not, and Contrast 2 tested the difference between the first-person and third-person conditions,

disregarding the no-visualisation control. Visualisation condition (*no visualisation control* = 0, *third-person perspective* = 1, *first-person perspective* = 2) was coded such that a positive score indicated the beneficial effect of visualisation over no-visualisation (in Contrast 1) and the first-person perspective over the third-person perspective (in Contrast 2).

Message condition. Within the message condition, the significant total effect of visualisation condition on intentions ($F(2, 254) = 12.12, p < .001, \eta_p^2 = .09$), became statistically non-significant when the mediators were included in the model ($F(2, 248) = 1.83, ns$) indicating full mediation of the effects of visualisation condition on intentions. Next, individual mediators were examined, as shown in the top half of Table 2. The third column shows the relationship between the independent variable (X) and the mediators (M), indicating that participants who visualised reported significantly higher scores than those who did not visualise in all potential mediating variables other than social norms (Contrast 1) (See Table 1 for descriptive statistics of mediating variables). Of those who visualised, those who used the first-person perspective reported significantly higher self-efficacy and action planning than those who used the third-person perspective (Contrast 2). The fourth column of Table 2 shows the relationship between the mediator (M) and the outcome variable (Y), indicating that all variables except PBC significantly predicted intentions. The fifth column shows the indirect effects of visualisation condition on intentions via each mediating variable, controlling for all other mediating variables. A significant indirect effect is indicated by confidence intervals that do not cross zero. This shows that both self-efficacy and action planning were significant unique mediators, both of the beneficial effect of visualisation, and of the beneficial effect of the first-person perspective over the third-person perspective. Coping planning was a unique mediator

of the effect of visualisation on intentions, but not of the beneficial effect of the first-person perspective.

No message condition. Within the no message condition, the total effect of visualisation condition on intentions to eat fruit was not significant, $F(2, 271) = < 1$, *ns*. The individual mediators were examined nonetheless, to explore why visualisation condition might not have affected intentions in the absence of a health message. The lower half of Table 2 presents this exploratory analysis. As shown in columns 3 and 4, as in the message condition, all mediating variables except norms predicted intentions. However, in the no message condition, action planning was the only mediating variable significantly affected by visualisation condition. Action planning was higher among those who visualised than those who did not, but the perspective used did not affect action planning as it did when participants had been presented with the health message. Further, there was a significant indirect effect of visualising on intentions via action planning.

Overall, the mediation analyses revealed that the beneficial effect of visualisation in the presence of a health message was mediated by increased self-efficacy, action planning and coping planning. Self-efficacy and action planning (but not coping planning) explained why the first-person perspective exerted a stronger effect on intentions than the third-person perspective.

Discussion

The present research aimed to explore the effectiveness of a visualisation task in conjunction with a health message to promote intentions to eat more fruit, and the role of the perspective used in the visualisation task in relation to such intentions. Findings revealed that there was a main effect of visualisation condition on intentions, such

that those who engaged in the visualisation task reported significantly stronger intentions than those who did not. However, further analyses revealed that the beneficial effect of visualisation condition on intentions held only among those participants who were also presented with the health message, for whom it exerted a small to medium sized effect on intentions. Further, within the message condition, perspective exerted a small to medium sized effect on intentions, the beneficial effect of visualisation being most pronounced among those participants who had used the first-person perspective. Within the no-message condition, visualisation was just as ineffective from the first-person perspective as from the third-person perspective. Although the effect sizes for visualization and perspective within the message condition were only small to medium (Cohen, 1992), this is not unexpected given the brevity of the visualization task. Effects may be stronger with a more extensive visualization task; participants undertook only one visualisation episode, and this may have been insufficient for adequate mental representations to form (Gregg, Hall, McGowan, & Hall, 2011; Martin & Hall, 1995; Pham & Taylor, 1999). In line with this, it has been shown that the more a visualization is repeated, the more intention change results (Anderson, 1983). The mediation analysis indicated that action planning, coping planning and self-efficacy accounted for the beneficial effect of visualisation on intentions within the message condition, and increased action planning and self-efficacy explained the increased intentions following use of the first-person (vs. third-person) perspective visualisation.

The results indicated that visualisation was ineffective in the absence of an informational health message. This was unexpected. It was predicted that although visualisation would be more effective when it was combined with a health message, it would still be effective without the presentation of a health message. This contrasts

with previous research finding beneficial effects of visualisation even in the absence of a message (e.g., Knäuper et al., 2011; Ouellette et al., 2005). It might be that the effects of visualisation differ according to the particular health behaviour being visualised, their baseline motivation to engage in that particular behaviour, or indeed the difficulty of the visualised behaviour. More research in diverse health behaviour contexts is needed to explain the differences in observed findings.

Visualisation was found to have a beneficial effect on self-efficacy, and this in turn increased intentions. This is consistent with research outside the health domain, showing that mental simulation of communication skills in the workplace has a beneficial effect on self-efficacy (Morin & Latham, 2000). Morin and Latham explained these results in terms of social cognitive theory (Bandura, 1986), arguing that visualisation facilitates enactive mastery, vicarious experience and self-guided persuasion, which have all been identified as being necessary for increasing self-efficacy. It is interesting to note that visualisation exerted its effect on intentions through self-efficacy, not PBC. Self-efficacy is concerned with an individual's perceptions of their mastery of a behaviour, whereas PBC is related to their perceptions of their ability to control whether or not they engage in the behaviour. It would appear that visualisation affects feelings of mastery, not control.

Visualisation was found to result in increased action planning. This effect was observed regardless of whether the participants were presented with the informational message or not. It is not surprising that action planning is increased whether participants are presented with a message or not- by its nature a visualisation task involves specifying how, where and when behaviour will be enacted. Coping planning operated slightly differently. Within the message condition, those participants who visualised reported increased coping planning, and this resulted in increased

intentions. However, within the no message condition, participants who visualised did not report increased coping planning compared to those who did not visualise. Action planning and coping planning represent differing strategies, and have been shown to be influential at different stages of the behaviour change process. Action planning is a task-facilitating strategy, and is influential early on in the behaviour change process, whereas coping planning is mainly a distraction-inhibiting strategy and therefore influential later on (Sniehotta et al., 2005). Participants who visualised eating fruit after reading a message about the benefits eating fruit were highly motivated to eat more fruit, so would presumably be motivated to plan what to do in the face of obstacles and distractions. In contrast, those in the no message condition who visualised were not motivated to eat more fruit, so would be less motivated to plan their way around potential obstacles.

Within the message condition, first-person perspective visualisations were shown to result in increased action planning and self-efficacy compared to the third-person perspective, and these variables were shown to mediate the beneficial effect of first-person perspective visualisations on intentions. That the first-person perspective increased action planning is in line with research showing that use of the first-person perspective is associated with increased detail, compared to the third-person perspective (McIsaac & Eich, 2002). It seems entirely plausible that a more detailed visualisation, as afforded by use of the first-person perspective, should result in a more detailed plan of action, and this increases motivation to engage in the behaviour. It should be noted, though, that the first-person perspective did not result in increased coping planning. It might be that the increased detail of a first-person perspective visualisation is not, alone, sufficient to promote planning around obstacles. Indeed, as noted above, coping planning might be dependent on a degree of existing

commitment to engage in the behaviour. Future research should aim to test this empirically. The mechanism by which the first-person perspective increases self-efficacy is also unclear- there is no reason to assume that increased detail would lead to increased feelings of mastery. However, the first-person perspective does have an increased realism in comparison to the third-person perspective- an individual will never see themselves engaging in a behaviour from the third-person perspective when they are actually engaging in the behaviour (as opposed to imagining engaging in the behaviour). It seems likely that the increased realism afforded by the first-person perspective would facilitate enactive mastery and vicarious experience to a greater extent than the third-person perspective. Again, future research should test this empirically.

Armitage and Reidy (2008) found that the beneficial effect of a process-based visualisation task on intentions to donate blood was mediated by TPB variables: increased subjective norms and perceived behavioural control with respect to blood donation. In contrast, although we found that visualisation increased TPB variables, the effects were not as strong as those on planning and self-efficacy, and TPB variables were not the underlying mechanism responsible for increased intentions. As stated previously, direct comparisons cannot be made with the Armitage and Reidy study due to differences in experimental design. However, the findings of this study do suggest that the TPB may not be the best theoretical framework within which to explore the beneficial effects of visualisation. Theories, which place more emphasis on mastery, may be more appropriate here- for example, social cognitive theory (Bandura, 1986) or self-determination theory (Ryan & Deci, 2000).

It should be noted that in the health literature, intention formation is generally presumed to precede planning. For example, the health action process approach

(HAPA; Schwarzer, 1992) assumes that planning occurs in a post-intention volitional phase of behaviour change, explaining how intentions are translated into action. The present research aimed to examine the motivational effects of visualising engaging in a health behaviour, and a measure of behaviour was not taken. That participants' fruit consumption was not assessed at follow-up is a limitation of the present research. This would have allowed for a clearer understanding of the relationship between visualisation planning, intentions and behaviour. Indeed, the endpoint of health promotion research should always be a change in behaviour; as such, future research could aim to examine whether visualisation also exerts an effect following intention formation. Further research utilizing a longitudinal research design would enable exploration of effects on behaviour and also allow for more accurate mediational analyses- it has been shown that conclusions drawn from mediational analyses based on cross-sectional research designs, as used in the present research, can be limited (e.g., Maxwell & Cole, 2007), and this is a further point that can be addressed in future research.

The present research adds important findings to the literature on the role of perspective in visualisation. It was found that the first-person perspective was more effective than the third-person perspective in increasing intentions to engage in the visualised health-related behaviour in the presence of a health information message. This finding is in contrast to those of Libby et al. (2007) and Vasquez and Buehler (2007). The present research also demonstrates that visualisation using the first-person perspective results in significantly higher action planning and self-efficacy than when the third-person perspective is used. It was suggested that this may be due to the increased level of detail and realism afforded by the first-person perspective. Thus, it seems likely that for other tasks where a high level of action planning and

self-efficacy is of paramount importance, first-person perspective visualization might be more appropriate than third-person perspective visualisation.

In conclusion, the present research has demonstrated that intentions to engage in a health behaviour can be boosted when a traditional informational health message is combined with a visualisation task. Both the message and visualisation task were short and simple, and could be incorporated into a more complex health intervention. Further research should aim to investigate how visualisation affects behaviour, and whether it can help increase the link between intentions and behaviour. Research shows that planning interventions can help translate intentions into behaviour, and visualisation could represent a simple means of increasing planning.

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Authors' Notes

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Table 1

Mean (SD) values for outcome and mediator variables as a function of message and visualisation conditions

	No message			Message		
	Control	Third-person	First-person	Control	Third-person	First-person
Intentions	3.55 (1.80)	3.77 (1.68)	3.47 (1.67)	3.42 (1.78)	3.85 (1.69)	4.68 (1.61)
Attitudes	5.61 (1.30)	5.70 (1.24)	5.68 (1.14)	5.64 (1.24)	5.83 (1.00)	6.11 (0.96)
Social norms	4.77 (1.48)	4.84 (1.49)	4.53 (1.41)	4.84 (1.19)	4.98 (1.30)	5.13 (1.46)
PBC	5.96 (1.34)	5.82 (1.32)	6.03 (1.35)	5.49 (1.58)	5.78 (1.47)	6.19 (1.24)
Self-efficacy	5.82 (1.45)	5.63 (1.43)	5.56 (1.63)	5.25 (1.49)	5.63 (1.27)	6.06 (1.22)
Action planning	3.04 (1.93)	4.02 (1.98)	3.49 (1.94)	3.10 (1.69)	4.06 (1.89)	4.85 (1.76)
Coping planning	3.66 (1.72)	4.03 (1.65)	3.35 (1.66)	3.50 (1.63)	3.96 (1.49)	4.14 (1.58)