Temporal Consequences, Message Framing, and Consideration of Future Consequences: Persuasion Effects on Adult Fruit Intake Intention and Resolve

GERT-JAN DE BRUIJN and JEEN BUDDING

Amsterdam School of Communication Research, University of Amsterdam, Amsterdam, The Netherlands

Message framing is a persuasive strategy that has seen mixed evidence for promoting fruit intake intentions, potentially because framed messages for fruit intake have not (a) explicitly compared short-term consequences versus long-term consequences, (b) considered individual-level differences in time perspective, and (c) used alternative measures of fruit intake intentions. In the present online study, the effects of persuasive messages created from temporal context (short term vs. long term) and message frame (gain framed vs. loss framed) were investigated on fruit intake intentions and resolve among a sample of Dutch adults who were categorized as either present oriented or future oriented. For intention and resolve, results showed a significant Type of Frame × Type of Temporal Context interaction, such that gain-framed messages were more persuasive when combined with long-term consequences and loss-framed messages were more persuasive when combined with short-term consequences. The effect sizes for these differences were similar for resolve and intention, but only differences for intentions were significant. No other effects were found. These results demonstrate that message framing theory may usefully consider the inclusion of temporal context of outcomes and alternative motivation measures to maximize their persuasive effects.

Message Framing

The majority of adults have insufficient intake of fruit, which is problematic for the prevention of noncommunicable diseases (World Health Organization, 2003). Effective communication strategies are needed to persuade adults to consume sufficient fruit. One popular strategy is to present message recipients with either positive outcomes of action or negative outcomes of inaction, depending on whether the promoted behavior serves a prevention or detection function. This tenet is highlighted in message framing theory (Rothman & Salovey, 1997), itself derived from prospect theory (Kahneman & Tversky, 1979). Message framing differentiates between two types of behaviors (prevention vs. detection) and two types of messages (gain framed vs. loss framed), with gain-framed messages theorized to be more persuasive for prevention behaviors and loss-framed messages more persuasive for detection behaviors. Given that eating fruit typically is recommended to prevent the onset of disease, gain-framed messages should outperform loss-framed messages in the promotion of fruit intake (Rothman & Salovey, 1997).

Message Framing, Fruit Consumption, Intention, and Resolve

Traditional intention measures are conceptualized as a motivation to act (Ajzen, 1991) or the degree to which someone has conscious plans to perform (or not perform) a specific behavior (Rhodes & Matheson, 2005; Warshaw & Davis, 1985). Intentions are key outcomes in persuasive strategies (McGuire, 1984), but main effects of framed messages have often been absent for fruit intake intentions (Brug, Ruiter, & van Assema, 2003; De Bruijn, Visscher, & Mollen, 2015; Dijkstra, Rothman, & Pietersma, 2011; Van Assema, Martens, Ruiter, & Brug, 2001) and other health-related intentions (Gallagher & Updegraff, 2012; O’Keefe & Jensen, 2007). This has led scholars to conclude that framing effects can be expected for behavioral outcomes but not for intentional outcomes (Gallagher & Updegraff, 2012). However, some recent studies have demonstrated that alternative measures of motivation, such as behavioral resolve or behavioral expectations, are influenced by framed persuasive messages (De Bruijn, Out, & Rhodes, 2014; Hing Lo, Smith, Taylor, Good, & Von Wagner, 2012).

Because traditional intention measures discount fluctuations in motivation over (short) periods of time and interactions with more volitional variables (Rhodes & Horne, 2013; Rhodes & Matheson, 2005; Warshaw & Davis, 1985), there is a substantial gap between intention and behaviors (Sheeran, 2002; Webb & Sheeran, 2006). In response to this poor predictive validity, Rhodes and Horne (2013) developed the Behavioral Resolve Scale, in which motivation is assessed via considerations of competing goals (e.g., I will eat two pieces...
of fruit, even when I feel like eating a snack) and contextual barriers (e.g., not having sufficient time to prepare fruit). Resolve resembles behavioral expectations (Rhodes & Matheson, 2005; Warshaw & Davis, 1985), in which an individual considers control limitations and motivation fluctuations as an adjunct to conscious intent (Warshaw & Davis, 1985). Although intention measures may indicate the direction of action (Rhodes & Horne, 2013; Warshaw & Davis, 1985). Indeed, research has shown that resolve and expectancy measures are better behavioral predictors, with people who have positive resolve scores being much more likely to act than people who have positive intention scores (Evans, Kawabata, & Thomas, 2015; Rhodes & Horne, 2013). Understanding which message frames are able to influence resolve would have an impact on public health, as changes in resolve are much more likely to lead to changes in behavior (De Bruijn et al., 2014).

Evidence for this is limited. Only one message framing experiment has directly compared intention with resolve (De Bruijn et al., 2014), with loss-framed messages impacting on exercise resolve but not on exercise intention. Although this runs counter to theoretical expectations from message framing theory, the proposed advantage of gain-framed messages over loss-framed messages has little support for physical activity specifically and preventive health in general (Gallagher & Updegraff, 2012; O’Keefe & Jensen, 2007). The motivating capacity of loss-framed messages could be explained by the substantial threat of negative information in a loss-framed message (Rogers & Prentice-Dunn, 1997), regardless of behavioral function.

Negative information may be particularly persuasive if it is personally relevant (Block & Keller, 1995; Meyers-Levy & Maheswaran, 2004). In line with this, De Bruijn and colleagues (2014) found that loss-framed messages were especially persuasive not only for insufficiently active people (who should feel especially threatened by loss-framed messages; see Van ‘t Riet, Ruiter, Werrij, Candel, & De Vries, 2010) but also when loss-framed message content used negative wordings, such as disease (“insufficient exercise increases your chance for heart disease”), as opposed to more positive wordings, such as health (“insufficient exercise prevents good health”). These negative consequences and wordings should be reflected in an increased motivation to consider and evaluate resources and barriers to action (i.e., resolve), but not in desirable and idealistic considerations of health outcomes, as reflected in intentions (De Bruijn et al., 2014; Hing Lo et al., 2012). As a result of this reasoning, De Bruijn and colleagues (2014) suggested that no effects of loss-framed messages should be found for standard intention measures, but that loss-framed messages should stimulate consideration of resources and barriers, which should be reflected in higher resolve scores. Thus, the following were hypothesized:

Hypothesis 1a: A loss-framed message will lead to more positive resolve scores than a gain-framed message.

### Message Framing and Temporal Context

Health-related outcomes may arise immediately, in the near future, or in the distant future. Nevertheless, outcomes in message framing typically compare positive with negative consequences rather than short-term consequences with long-term consequences. To our knowledge, only a handful of studies have investigated how temporal context influences intentions (Bernstein, Wood, & Erickson, 2016; Dimmock, Jackson, Clear, & Law, 2013; Gerend & Cullen, 2008; Nan, Zhao, Yang, & Iles, 2015; Orbell & Kyriakaki, 2008) and, to a lesser extent, how temporal context interacts with message frame to influence intentions (Bernstein et al., 2016; De Bruijn, Spaans, Jansen, & Van ‘t Riet, 2016; Gerend & Cullen, 2008; Nan et al., 2015; Orbell & Kyriakaki, 2008). Only one study has investigated how temporal context interacts with message frame to influence behavioral expectations (Hing Lo et al., 2012), and no study has focused on resolve outcomes.

Evidence has shown that more immediate outcomes are more motivating, particularly when combined with negative information (Chandran & Menon, 2004; De Bruijn et al., 2016; Green & Myerson, 2004; Hing Lo et al., 2012; Trope & Liberman, 2003). For instance, De Bruijn and colleagues (2016) found that short-term consequences only changed intentions toward hearing loss prevention when combined with loss-framed information. Similar effects were obtained for recycling intentions in adults (White, MacDonnell, & Dahl, 2011) and fruit intake intentions in undergraduate students (Hing Lo et al., 2012). In contrast, other research either has failed to detect an interaction between message frame and temporal context (Bernstein et al., 2016; Nan et al., 2015) or has found opposite results (Gerend & Cullen, 2008). For instance, in a study on alcohol consumption in undergraduate students, Gerend and Cullen (2008) found that short-term consequences were only persuasive when combined with gain-framed messages. In contrast, loss-framed messages did not influence alcohol intake, regardless of temporal context. However, a recent similar experiment on alcohol consumption (Bernstein et al., 2016) could not replicate the findings from Gerend and Cullen. Furthermore, nonsignificant interaction effects of message frame and temporal context have also been reported for smoking intentions (Nan et al., 2015).

### Temporal Context, Message Framing, and Consideration of Future Consequences (CFC)

Reasons for these inconsistencies are unclear, but they may reflect moderator effects at the individual level (Covey, 2015). One individual-level trait that has intuitive appeal when one is manipulating the temporal context of outcomes is CFC (Strathman, Glicker, Boninger, & Edwards, 1994), which reflects the extent to which people consider either more short (er) term outcomes or more long(er) term outcomes. Low-CFC individuals tend to be more preoccupied with immediate need and concerns (Strathman et al., 1994), and so they should be
more readily persuaded by messages that emphasize short-term outcomes. In contrast, high-CFC individuals tend to focus on future implications of their current actions and so should be more readily persuaded by messages that emphasize long-term outcomes.

Research to date has not explicitly compared how persuasive messages created from message frame and temporal context differently affect individuals with either low or high levels of CFC. For instance, although Dimmock and colleagues (2013) matched the temporal context of outcomes with an individual’s CFC disposition (i.e., high-CFC participants receiving messages stressing long-term benefits), they did not manipulate the framing of these outcomes. In contrast, a study by O’Connor, Warttig, Conner, and Lawton (2009) demonstrated that loss-framed messages were more persuasive for high-CFC participants and gain-framed messages more persuasive for low-CFC participants, but their persuasive messages did not manipulate temporal context. In three other CFC studies (Orbell & Hagger, 2006; Orbell & Kyriakaki, 2008; Orbell, Perugini, & Rakow, 2004), temporal context was combined with both positive and negative consequences of action (i.e., applying sunscreen prevents skin cancer later in life but also takes time, takes effort, and costs money now), so omitting the tenets of message framing theory (in which gains of actions are compared with losses of inaction). Other studies on message frame and temporal context have not incorporated CFC dispositions (Bernstein et al., 2016; De Bruijn et al., 2016; Gerend & Cullen, 2008; Hing Lo et al., 2012; Nan et al., 2015; White et al., 2011).

The lack of such an investigation is perhaps not surprising, as the integration of current evidence on message framing, temporal context, and level of CFC suggests two conflicting hypotheses. Specifically, research has shown that loss-framed messages are more persuasive for high-CFC individuals (O’Connor et al., 2009) and when combined with short-term outcomes (De Bruijn et al., 2016; White et al., 2011). However, when these research findings are combined, it may suggest that high-CFC individuals should be more effectively persuaded when loss-framed messages (O’Connor et al., 2009) are combined with short-term outcomes (De Bruijn et al., 2016; White et al., 2011), an idea that runs counter to theoretical ideas (Strathman et al., 1994). Rather than hypothesizing, we formulated a research question about this three-way interaction, a strategy that has some precedent in research on CFC and the effectiveness of persuasive health-related messages (Kim & Nan, 2015) and in temporal framing research (Kim & Nan, 2016).

The Present Study

The aim of the present study was to test the main effects of, and interaction effects between, message frame (loss framed vs. gain framed), temporal context (short-term vs. long-term outcomes), and CFC disposition (present-oriented low-CFC individuals vs. future-oriented high-CFC individuals) on intentions and resolve to consume sufficient fruit in a sample of Dutch adults. Based on the evidence, we hypothesized that loss-framed messages would influence resolve but not intention (see Hypothesis 1 above). We also hypothesized a two-way interaction between message frame and temporal context, such that loss-framed messages would be most persuasive when combined with short-term outcomes for resolve (Hypothesis 2a) but not for intention (Hypothesis 2b). We also expected short-term consequences to be more persuasive for low-CFC individuals and long-term consequences to be more persuasive for high-CFC individuals regarding resolve (Hypothesis 3a) but not intention (Hypothesis 3b). Finally, we expected loss-framed messages to be persuasive for high-CFC individuals and gain-framed messages to be persuasive for low-CFC individuals regarding resolve (Hypothesis 4a) but not intention (Hypothesis 4b). A research question was formulated for the three-way interaction:

Research Question 1: What is the moderating effect of CFC in the interaction between message frame and temporal context on intentions and resolve with regard to sufficient fruit intake?

Methods

Participants for this study were recruited via announcements on social media websites and intranet websites. The announcements informed potential participants that the study would be done online and would be open to anyone age 18 and older and who did not have a medical condition that would prevent him or her from eating fruit. It also informed participants that the purpose of the study was to understand why people eat fruit and that they would be required to read a short leaflet on outcomes of fruit consumption. Participants were further informed that participating would take approximately 10 minutes of their time and that they could opt to be included in a raffle in which a €20 (approximately $25) voucher could be won. Finally, they were informed that the study had been approved by the ethical committee of the host institution, that study participation did not entail any risk, and that they would not be exposed to explicit materials. In total, 278 individuals participated in the study—their average age was 28.6 years (SD = 11.3), and 117 participants (42.1%) were male.

Manipulation

Participants were randomized into one of four conditions using simple randomization procedures (Suresh, 2011). Prior to message exposure, participants were instructed to carefully read the information. Message content was developed by considering previous message framing studies regarding fruit intake (De Bruijn et al., 2015; Dijkstra et al., 2011; Gerend & Maner, 2011) and categorizing health outcomes as either short term or long term. After discussion between ourselves, four messages of similar length (approximately 100 words) and layout were created. Negative wordings were used to maintain comparability with other framing studies on resolve (De Bruijn et al., 2014). Following exposure, a manipulation check was performed for type of frame and type of term. Finally, participants provided information on the four dependent variables and were allowed the opportunity to enter the raffle. The Appendix has the messages and manipulation check items.
**Measures**

Preexposure measures were age, gender, involvement, self-efficacy, CFC, and fruit intake in the previous 2 weeks. The CFC measure was used to categorize participants as either low or high CFC based on median split, whereas involvement, self-efficacy, and fruit intake in the previous 2 weeks were used as covariates in the main analyses, given their role in message framing effectiveness (De Graaf, De Bruijn, & Van den Putte, 2015; Kessels, Ruiter, & Jansma, 2010; Van ‘t Riet, Ruiter, & De Vries, 2012). Involvement was assessed with four items on 7-point scales from a validated questionnaire (Zaichkowsky, 1985) previously applied to message framing work (De Graaf et al., 2015). Participants were asked whether, for them, eating at least two pieces of fruit per day was (a) very unimportant—very important, (b) very irrelevant—very relevant, (c) very worthless—very valuable and whether it (d) doesn’t matter to me—matters a lot to me (α = .91). Self-efficacy and CFC items had 7-point Likert scales (+3 = totally agree, −3 = totally disagree). Four items assessed self-efficacy, questioning participants whether they believed they were (a) very able to—very unable and (b) very confident—very unconfident to eat at least two pieces of fruit per day and whether they believed that eating at least two pieces of fruit per day was (c) very easy—very difficult and (d) very effortful—very effortless for them (α = .90). Twelve items assessed CFC, derived from a validated questionnaire (Strathman et al., 1994) translated into the Dutch language (Rappange, Brouwer, & Van Exel, 2009). Example items were “I only act to satisfy immediate concerns, figuring the future will take care of itself” and “I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes” (α = .60). Fruit intake in the past 2 weeks served as a proxy for personal relevance (Kessels et al., 2010; Van ‘t Riet et al., 2012) and was assessed with a validated questionnaire (Bogers, Van Assema, Kester, Westerterp, & Dagnelie, 2004) querying participants on usual intake (pieces per day) and frequency (days per week) of fruit commonly consumed in The Netherlands. Mean intake per week was computed by multiplying usual intake with usual frequency and dividing that score by 7.

Postexposure measures were intention and resolve. Items and constructs were presented randomly to participants, with response categories ranging from totally disagree (−3) to totally agree (+3). Intention was assessed with three items from previous framing research, namely, (a) I intend to, (b) I plan to, and (c) it is likely I will eat two pieces of fruit per day (α = .90; De Bruijn et al., 2015). Resolve was assessed with three items, following suggestions (De Bruijn et al., 2014; Rhodes & Horne, 2013) and taking well-known barriers to, and goal conflict with, intake of sufficient fruit into consideration (Stroebe, van Koningsbruggen, Papis, & Aarts, 2013). Items were (a) I will make eating two pieces of fruit per day my priority, and I will eat at least two pieces of fruit, even ... (b) if I do not feel like eating them, (c) if I feel like eating unhealthy snacks (α = .89).

**Results**

**Basic Descriptive Data**

Table 1 presents descriptive data for demographic and study variables across the entire sample. Average fruit intake was 2.6 pieces of fruit per day, and participants had relatively positive intentions and perceptions of self-efficacy and involvement. Scores for CFC and resolve were around midscale. As in previous comparison studies on intention and resolve (De Bruijn et al., 2014; Rhodes & Horne, 2013), intention was significantly higher than resolve, t(277) = 16.06, p < .001.

**Randomization and Manipulation Checks**

For the randomization check, a 2 (type of frame: gain vs. loss) × 2 (type of term: short term vs. long term) × 2 (CFC: low CFC [present oriented] vs. high CFC [future oriented]) univariate analysis of variance showed no differences in age, involvement, self-efficacy, or previous fruit intake (all ps > .136). A chi-square test showed no differences in gender distributions (p = .320). For the manipulation check of type of frame, the same 2 × 2 × 2 univariate analysis of variance showed no effect of type of term and no two-way or three-way interaction (all ps > .061). As expected, there was an effect of type of frame, F(1, 270) = 297.28, p < .001, η² = .52, with participants in gain-framed conditions reporting that the persuasive message highlighted more positive outcomes (M = 1.84, SE = .11) than participants in loss-framed conditions (M = −0.99, SE = .12). For the manipulation check of type of

| Variable     | M (SD) | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     |
|--------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1. Gender (% male) | 42.1   |       |       |       |       |       |       |       |       |
| 2. Age       | 28.6 (11.3) | .03   |     |       |       |       |       |       |       |
| 3. CFC       | 0.1 (0.2) | .07   | -.03 |       |       |       |       |       |       |
| 4. Involvement | 0.8 (1.0) | .12*  | .08  | .06   |       |       |       |       |       |
| 5. Self-efficacy | 1.9 (2.0) | .14*  | .03  | .05   | .29***|       |       |       |       |
| 6. Fruit intake | 2.6 (1.5) | .13*  | .04  | −.05  | .18** | .25***|       |       |       |
| 7. Intention  | 1.1 (1.4) | .21***| .12  | .10   | .48***| .41***| .28***|       |       |
| 8. Resolve    | 0.0 (1.5) | .15*  | .14* | .10   | .36***| .30***| .27***| .73***|       |

**Note.** With the exception of age, gender, and fruit intake, scores for all variables could range from −3 (most negative) to +3 (most positive). Gender was coded as 0 = male, 1 = female. CFC = Consideration of Future Consequences Scale. * p < .05. ** p < .01. *** p < .001.
term, the same $2 \times 2 \times 2$ univariate analysis of variance showed no effect of type of frame and no two-way or three-way interaction (all $p$s $>$ .313). As expected, there was an effect of type of term, $F(1, 270) = 288.22$, $p < .001$, $\eta^2 = .52$, with participants in short-term conditions indicating that the persuasive message highlighted more shorter term outcomes ($M = 1.18$, $SE = .13$) and those in long-term conditions indicating that the message highlighted more longer term outcomes ($M = -2.02$, $SE = .14$). Thus, randomization and manipulation were successful.

**Effects of the Persuasive Messages**

Message effects were tested in a $2$ (type of frame: gain vs. loss) $\times$ $2$ (type of term: short term vs. long term) $\times$ $2$ (CFC: presented oriented vs. future oriented) analysis of covariance, with involvement, self-efficacy, and personal relevance as covariates. For CFC, a median split (median = 0.167) was used to categorize participants as either more present oriented (low CFC; $n = 151$) or more future oriented (high CFC: $n = 127$). Separate analyses of covariance were run for intention and resolve. Significant multivariate effects were followed up by planned comparisons and post hoc tests. To compare group means, we calculated Cohen’s effect size ($d$), and $p < .05$ indicated statistical significance.

Mean scores for the dependent variables across the conditions are in Table 2, whereas Table 3 has the test values for the analysis of covariance. For resolve, there was no effect of type of term, of CFC, or of type of frame, and so Hypothesis 1a was rejected. There were no two-way interactions between CFC and type of frame or between CFC and type of term. Therefore, Hypotheses 3a and 4a were rejected. Although there was an interaction between type of frame and type of term (see Figure 1) and a significant effect of condition in the subsequent follow-up test, $F(3, 274) = 3.32$, $p = .020$, the planned comparisons did not detect significant differences between the four conditions (mean differences = 0.03–0.60, with all $p$s $>$ .073 and all $d$s $<$ 0.41). Thus, Hypothesis 2a was rejected.

For intention, there was no significant effect of type of frame, confirming Hypothesis 1b. There was also no effect of type of term or CFC. No two-way interactions between CFC and type of frame or between CFC and type of term were found, confirming Hypotheses 3c and 4c. However, there was an interaction between type of frame and type of term, and so Hypothesis 2c was rejected. The significant interaction is plotted in Figure 1. Decomposing this significant interaction revealed a significant effect of condition, $F(3, 274) = 4.67$, $p = .003$, with planned comparisons showing that intention was significantly higher when a gain-framed message was combined with long-term consequences than when a gain-framed message was combined with short-term consequences ($M_{\text{difference}} = 0.58$, $p = .043$, $d = 0.42$) or when long-term consequences were combined with a loss-framed message ($M_{\text{difference}} = 0.70$, $p = .016$, $d = 0.50$). Intention was also significantly higher when a loss-framed message was combined with short-term consequences than when a loss-framed message was combined with long-term consequences ($M_{\text{difference}} = 0.61$, $p = .048$, $d = 0.48$). No other significant differences were found (all $p$s $>$ .115). With regard to the research question, no significant three-way interactions were observed for intention and resolve.

**Discussion**

Persuasive effects of messages that were successful manipulations of message frame and temporal context of outcomes were investigated on resolve and intention outcomes. It was also investigated whether these effects would be moderated by CFC dispositions while important covariates of framing effects were controlled for. No three-way interaction was found, nor were there interactions between CFC and message frame or between CFC and temporal context. However, some notable results were found with regard to the message frame and temporal context interaction.

Based on evidence from the exercise domain (De Bruijn et al., 2014), we hypothesized persuasive effects of loss-framed messages on resolve but not on intention. Although no significant main effects for message frame were found, intention was found to be higher when a loss-framed message was combined with short-term consequences than when a loss-framed message

### Table 2. Means (SD) for demographic and study variables across conditions ($n = 278$)

| Present-oriented CFC | Future-oriented CFC |
|----------------------|---------------------|
| **Loss-framed message** | **Gain-framed message** | **Loss-framed message** | **Gain-framed message** |
| Short term ($n = 39$) | Long term ($n = 31$) | Short term ($n = 39$) | Long term ($n = 42$) | Short term ($n = 31$) | Short term ($n = 31$) | Short term ($n = 31$) | Long term ($n = 41$) |
| Gender (% male) | 43.6 | 51.6 | 53.8 | 31.0 | 38.7 | 41.7 | 31.0 | 41.5 |
| Age | 28.2 (12.4) | 26.6 (8.5) | 28.2 (10.4) | 29.4 (12.1) | 31.2 (13.0) | 28.3 (10.1) | 30.2 (13.1) | 26.8 (10.1) |
| Involvement | 0.8 (1.2) | 0.8 (1.1) | 0.6 (1.4) | 0.8 (1.6) | 1.2 (0.8) | 0.8 (1.6) | 0.9 (1.1) | 1.2 (1.2) |
| Self-efficacy | 1.9 (0.9) | 1.5 (1.4) | 1.6 (1.2) | 1.5 (1.7) | 2.1 (1.0) | 1.9 (0.9) | 1.8 (1.6) | 1.9 (1.3) |
| Fruit intake | 2.8 (1.5) | 2.6 (1.3) | 2.4 (1.6) | 2.7 (1.6) | 2.8 (1.4) | 2.8 (1.9) | 2.7 (1.5) | 2.4 (1.4) |
| Intention | 1.2 (1.2) | 0.6 (1.5) | 0.7 (1.4) | 1.4 (1.4) | 1.4 (1.2) | 0.8 (1.5) | 0.9 (1.4) | 1.3 (1.4) |
| Resolve | 0.1 (1.6) | -0.4 (1.3) | -0.4 (1.5) | 0.3 (1.7) | 0.5 (1.3) | -0.1 (1.4) | -0.2 (1.3) | 0.2 (1.4) |

*Note.* Fruit intake is in pieces per day. Scores for involvement, self-efficacy, intention, and resolve could range from -3 (most negative) to +3 (most positive).

CFC = Consideration of Future Consequences Scale.

*aBaseline covariate. bDependent variable.*
was combined with long-term consequences. Although the differences in resolve between the four experimental conditions were not significant, the effect sizes for resolve differences were similar to differences in intentions, reflecting earlier work on fruit intake intentions and expectations (Hing Lo et al., 2012). Nevertheless, it is unclear why no persuasive main effects of loss-framed messages were found for resolve. Although messages were created to stress negative wordings (e.g., disease and obesity), it may be that the wordings in the De Bruijn and colleagues (2014) study were perceived to be more threatening, leading to more pronounced effects on resolve.

Although no effects of loss-framed messages on intention were hypothesized (De Bruijn et al., 2014), loss-framed messages did impact on intention when combined with short-term outcomes. This indicates differences in persuasive effectiveness of loss-framed messages between fruit intake and exercise. Negative information (from either stressing short-term consequences or emphasizing negative wordings) may potentially act as a stronger mobilizer of cognitive resources toward overcoming exercise barriers (i.e., resolve measure) than barriers preventing fruit intake. That is, exercise is considered to be a strenuous behavior that requires more cognitive control of individuals so as to better deal and cope with barriers and restraints than more mundane and lower effort behaviors (Bandura, 1989; Rhodes & de Bruijn, 2010; Rhodes, Plotnikoff, & Courneya, 2008), such as moderate-intensity physical activities and fruit intake (De Bruijn, Brug, & Van Lenthe, 2009; De Bruijn, de Groot, van den Putte, & Rhodes, 2009; Rhodes & de Bruijn, 2010). Thus, negative information may stimulate participants to believe that they need to exert more effort toward dealing and coping with barriers for exercise behaviors than for fruit consumption. Future research is needed to ascertain whether differences and similarities of message framing effects on intention and resolve are persistent over

### Table 3. Mean squares, F values, statistical significance, and eta-squared from analyses of covariance for intention and resolve (n = 278)

| Independent variables                                      | Mean square | F     | p       | η²   |
|------------------------------------------------------------|-------------|-------|---------|------|
| Type of frame                                              | 2.21/0.03   | 1.75/0.02 | .187/.893 | .01/.00 |
| Type of temporal context                                   | 0.09/0.09   | 0.07/0.05 | .785/.823 | .00/.00 |
| Level of CFC                                               | 0.13/0.08   | 0.11/0.04 | .745/.835 | .00/.00 |
| Frame × Temporal Context                                   | 14.72/13.00 | 11.65/7.57 | .001/.006 | .04/.03 |
| Frame × CFC                                                | 0.87/2.25   | 0.69/1.31 | .407/.253 | .00/.01 |
| Temporal Context × CFC                                      | 0.17/0.21   | 0.14/0.12 | .712/.729 | .00/.00 |
| Temporal Context × CFC × Frame                             | 0.10/0.16   | 0.08/0.10 | .784/.758 | .00/.00 |

| Covariates                                          | Mean square | F     | p       | η²   |
|------------------------------------------------------|-------------|-------|---------|------|
| Self-efficacy                                        | 32.90/15.91 | 26.03/9.26 | <.001/.003 | .09/.03 |
| Involvement                                          | 61.12/37.78 | 48.36/22.00 | <.001/<.001 | .15/.08 |
| Personal relevance                                   | 10.68/16.25 | 8.45/9.46 | .004/.002 | .03/.03 |

Note. —/— reflect values for intention and resolve outcomes, respectively. Values were assessed at df (1, 267). CFC = Consideration of Future Consequences Scale.
behaviors that differ in their strenuous and cognitively controlled nature.

Gain-framed messages were more persuasive when they stressed long-term outcomes compared to short-term outcomes in a gain-framed message or long-term outcomes in a loss-framed message. These findings are partially in line with message framing theory and with recent work demonstrating that gain-framed messages impact fruit intake (intentions) when individual-level moderator variables are considered (Dijkstra et al., 2011; Gerend & Maner, 2011). However, they contrast with earlier work on message frame and temporal context, in which gain-framed messages were unpersuasive regardless of temporal context (De Bruijn et al., 2016) or only persuasive when combined with long-term outcomes (Gerend & Cullen, 2008). Evidence for the effects of temporal context is often described from the perspective of temporal discounting (Green, Myerson, & Ostaszewski, 1999) or delayed rewards (Green, Fry, & Myerson, 1994; Green & Myerson, 2004), whereby people discount future outcomes more than more immediate outcomes, even though these outcomes are factually the same. However, discounting future outcomes is not equally distributed across age groups, with children, adolescents, and young adults disproportionately discounting the future compared to adults and the elderly (Green et al., 1994). These age-related differences may account for the mixed evidence on framing and temporal context effects. That is, framing effects only occur in adolescents when losses are described in short-term outcomes (De Bruijn et al., 2016). For adults (as per the present study) loss-framed (vs. gain-framed) messages can be combined with short-term (vs. long-term) consequences to be persuasive (White et al., 2011), whereas evidence from young adult undergraduate students is mixed (Bernstein et al., 2016; Gerend & Cullen, 2008; Nan et al., 2015). More research in diverse age groups is therefore needed to better understand message framing and temporal context effects.

The issue of concern with future (or immediate) outcomes was also investigated in the present study, in which participants were categorized as being either present oriented (low CFC) or future oriented (high CFC). To our knowledge, our study is the first to test the unique and interactive effects of temporal context and message frame across levels of CFC dispositions. However, none of the hypotheses related to CFC were confirmed. One of the reasons for this is that tentative hypotheses were formulated based on theoretical assumptions (Strathman et al., 1994) and scattered and inconsistent evidence of CFC effects in the message frame–temporal context interaction (Dimmock et al., 2013; O’Connor et al., 2009). Alternatively, the lack of support may also be due to problems with the CFC measure. Even though we used the full 12-item validated translated version of the CFC scale (Rappange et al., 2009) to maintain comparability with other CFC studies, Cronbach’s alpha for the scale was low in the present study. Not only was low reliability of the CFC scale reported earlier (Rappange et al., 2009), but there are also some reservations about the construct validity and practical applicability of the scale, particularly for future-oriented factors (Rappange et al., 2009). Additional ways to measure or manipulate temporal mindset would be helpful when studying temporal mindset as a moderator of messages that manipulate temporal context and message frame of outcomes.

Several limitations should be noted. First, no behavioral outcome was measured, so it is unclear whether these messages were able to influence fruit intake. This is an important issue for future research, as most of the evidence supporting the tenets of framing effects is found for behavioral outcomes (Gallagher & Updegraff, 2012). Second, resolve measures motivation around contextual barriers and may therefore also reflect self-efficacy perceptions, with intention an indicator of general self-efficacy and resolve an indicator of situational self-efficacy. This would be potentially problematic when deciding on which behavioral predictors should be assessed in framing interventions. To add to the confusion between motivation and self-efficacy, some recent work has also suggested that standard self-efficacy measures may also reflect motivation rather than perceived capability (Williams & Rhodes, 2016). Although beyond the scope of this article, it does demonstrate that persuasion outcomes that are considered to be key behavioral predictors should be carefully selected and properly assessed in framing interventions. Third, although participants were instructed to carefully read the content of the messages, no measure of message attendance and processing was used. Future research may need to incorporate such measures as eye-tracking techniques to understand how messages created from message frames and temporal context are attended to and processed (O’Malley & Latimer, 2013). Fourth, a recent study on fruit and vegetable intake manipulated time frame across four conditions prior to eliciting desirability (i.e., behavioral and normative) and feasibility (i.e., control) beliefs (Lutchyn & Yzer, 2011) and found that participants in the shorter temporal distance condition (e.g., tomorrow) listed more control beliefs than normative or behavioral beliefs. In contrast, participants in the longer temporal distance condition (e.g., 6 months from now) listed more behavioral beliefs than control beliefs. This suggests that temporal distance also affects what type of beliefs (i.e., behavioral vs. control) are influenced. Although message framing typically targets behavioral beliefs, investigating whether temporal distance also requires the inclusion of (for example) control beliefs in a persuasive message to enhance persuasion would be worthwhile. Finally, although similar effects were found in a larger sample (Hing Lo et al., 2012), the sample sizes for each of the eight conditions were relatively low, which may have hampered the ability to detect smaller main and interaction effects.

In summary, the present study found that intention and resolve to eat sufficient fruit can be enhanced by combining gain-framed messages with long-term outcomes or loss-framed messages with short-term outcomes. These effects occur when self-efficacy, personal relevance, and involvement are controlled for, and they are independent of future- or present-orientation levels. Health campaigns that aim to promote fruit intake motivation should preferably use this combination of message frame and temporal context. The results also suggest that moderator effects of message frame should also be sought
at the level of message content rather than solely at the individual level (Covey, 2015; De Bruijn et al., 2014).

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. doi:10.1016/0749-5978(91)90020-T

Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist, 44*(9), 1175–1184. doi:10.1037/0003-066X.44.9.1175

Bernstein, M. H., Wood, M. D., & Erickson, L. R. (2016). The effectiveness of message framing and temporal context on college student alcohol use and problems: A selective e-mail intervention. *Alcohol and Alcoholism, 51*(1), 106–116. doi:10.1093/alcalc/agy091

Block, L. G., & Keller, P. A. (1995). When to accentuate the negative: The effects of perceived efficacy and message framing on intentions to perform a health-related behavior. *Journal of Marketing Research, 32*, 192–203. doi:10.2307/312047

Bogers, R. P., Van Assema, P., Kester, A. D. M., Westerterp, K. R., & Visschers, I. (2015). Effects of previous fruit intake on exercise intentions and resolve. *British Journal of Health Psychology, 20*(1), 159–179. doi:10.1111/bjhp.12086

Bruijn, G. J., Out, K., & Rhodes, R. E. (2014). Testing the effects of systematic, heuristic, or both types of processing occur. *Health Psychology*, 33(1), 1–8. doi:10.1177/0297624613510702

Covey, J. (2015). The role of dispositional factors in moderating message framing effects. *Health Psychology, 33*(1), 52–65. doi:10.1037/a0029305

De Bruijn, G. J., Brug, J., & Van Lenthe, F. J. (2009). Neuroticism, conscientiousness and fruit consumption: Exploring mediator and moderator effects in the theory of planned behaviour. *Psychology & Health, 24*(9), 1051–1069. doi:10.1080/08870440802242821

De Bruijn, G. J., de Groot, R., van den Putte, B., & Rhodes, R. (2009). Conscientiousness, extraversion, and action control: Comparing moderate and vigorous physical activity. *Journal of Sports and Exercise Psychology, 31*(6), 724–742.

De Bruijn, G. J., Out, K., & Rhodes, R. E. (2014). Testing the effects of message framing, kernel state, and exercise guideline adherence on exercise intentions and resolve. *British Journal of Health Psychology, 19*, 871–885. doi:10.1111/bjhp.12086

De Bruijn, G. J., Spaans, P., Jansen, B., & Van ’t Riet, J. (2016). Testing the effects of a message framing intervention on intentions towards hearing loss prevention in adolescents. *Health Education Research, 31*(2), 161–170. doi:10.1093/her/cyw000

De Bruijn, G. J., Vischer, I., & Mollen, S. (2015). Effects of previous fruit intake, descriptive majority norms, and message framing on fruit intake intentions and behaviours in Dutch adults across a 1-week period. *Journal of Nutrition Education and Behaviour, 47*(3), 234–241.e1. doi:10.1016/j.jneb.2015.02.001

De Graaf, A., De Bruijn, G., & Van den Putte, B. (2015). Effects of issue involvement and framing of a responsible drinking message on attitudes, intentions, and behaviour. *Journal of Health Communication, 20*(8), 989–994. doi:10.1080/10810730.2015.1018623

Dijksstra, A., Rothman, A., & Pieterson, S. (2011). The persuasive effects of framing messages on fruit and vegetable consumption according to regulatory focus theory. *Psychology & Health, 26*(8), 1036–1048. doi:10.1080/08870446.2010.526715

Dimmock, A., Jackson, B., Clear, E., & Law, H. (2013). Matching temporal frame to recipients’ time orientation in exercise messaging: Does argument quality matter? *Psychology of Sport and Exercise, 14*(6), 804–812. doi:10.1016/j.psychsport.2013.06.002

Evans, R., Kawabata, M., & Thomas, S. (2015). Prediction of fruit and vegetable intake: The importance of contextualization motivation. *British Journal of Health Psychology, 20*(3), 534–548. doi:10.1111/bjhp.12123

Gallagher, K. M., & Updegraff, J. A. (2012). Health message framing effects on attitudes, intentions, and behaviour: A meta-analytic review. *Annals of Behavioural Medicine, 43*(1), 101–116. doi:10.1007/s12160-011-9308-7

Gerend, M. A., & Cullen, M. (2008). Effects of message framing and temporal context on college student drinking behaviour. *Journal of Experimental Social Psychology, 44*(4), 1167–1173. doi:10.1016/j.jesp.2008.02.007

Gerend, M. A., & Maner, J. K. (2011). Fear, anger, fruits, and veggies: Interactive effects of emotion and message framing on health behaviour. *Health Psychology, 30*(4), 420–423. doi:10.1037/a0021981

Green, L., Fry, A. F., & Myerson, J. (1994). Discounting of delayed rewards: A life-span comparison. *Psychological Science, 5*(1), 33–36. doi:10.1111/psi.1994.5.issue-1

Green, L., & Myerson, J. (2004). A discounting framework for choice with delayed and probabilistic rewards. *Psychological Bulletin, 130*(5), 769–792. doi:10.1037/0033-2909.130.5.769

Green, L., Myerson, J., & Ostaszewski, P. (1999). Discounting of delayed rewards across the life span: Age differences in individual discounting functions. *Behavioral Processes, 46*(1), 89–96. doi:10.1016/S0165-6379(99)00021-2

Hing Lo, S., Smith, S., Taylor, M., Good, A., & Von Wagner, C. (2012). The effect of temporal framing on behavioural intentions, expectations, and behaviour: The case of healthy eating. *Journal of Applied Biobehavioural Research, 17*(3), 202–213. doi:10.1751/j.1759-8981.2012.00085.x

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47*(2), 263–291. doi:10.2307/1914185

Kessels, L. T., Ruiter, R. A., & Jansma, B. M. (2010). Increased attention but more efficient disengagement: Neuroscientific evidence for defensive processing of threatening health information. *Health Psychology, 29*(4), 346–354. doi:10.1037/a0019372

Kim, J., & Nan, X. (2015). Consideration of future consequences and HPV vaccine uptake among young adults. *Journal of Health Communication, 20*(9), 1033–1040. doi:10.1080/10810730.2015.1018583

Kim, J., & Nan, X. (2016). Temporal framing effects differ for narrative versus non-narrative messages: The case of promoting HPV vaccination. *Communication Research. Advance online publication. doi:10.1111/j.0093-6502.2016.01490.x*

Lutelny, Y., & Yzer, M. (2011). Construal level theory and theory of planned behaviour: Time frame effects on salient belief generation. *Journal of Health Communication, 16*(6), 595–606. doi:10.1080/10810730.2011.551991

McGuire, W. J. (1984). Public communication as a strategy for inducing health-promoting behavioural change. *Preventive Medicine, 13*(3), 299–319. doi:10.1016/0091-7435(84)90086-0

Meyers-Levy, J., & Maheswaran, D. (2004). Exploring message framing outcomes when systematic, heuristic, or both types of processing occur. *Journal of Consumer Psychology, 14*(1), 159–167.

Nan, X., Zhao, X., Yang, B., & Iles, I. (2015). Effectiveness of cigarette warning labels: Examining the impact of graphics, message framing, and temporal framing. *Health Communication, 30*(1), 81–89. doi:10.1080/104010236.2013.841531

O’Connor, D. B., Wartig, S., Conner, M., & Lawton, R. (2009). Raising awareness of hypertension risk through a Web-based framing intervention: Does consideration of future consequences make a difference? *Psychology, Health, and Medicine, 14*(2), 213–219. doi:10.1080/13548005.2008.2721618

O’Keefe, D. J., & Jensen, J. D. (2007). The relative persuasiveness of gain-framed and loss-framed messages for encouraging disease prevention behaviours: A meta-analytic review. *Journal of Health Communication, 12*(7), 623–644. doi:10.1080/10810730701615198
O’Malley, D., & Latimer, A. (2013). Gaining perspective: The effects of message frame on viewer attention to and recall of osteoporosis prevention print advertisements. Journal of Health Psychology, 18(11), 1400–1410. doi:10.1177/1359105312456323

Orbell, S., & Hagger, M. (2006). Temporal framing and the decision to take part in type 2 diabetes screening: Effects of individual differences in consideration of future consequences on persuasion. Health Psychology, 25(4), 537–548. doi:10.1037/0278-6133.25.4.537

Orbell, S., & Kyriakaki, M. (2008). Temporal framing and persuasion to adopt preventive health behaviour: Moderating effects of individual differences in consideration of future consequences on sunscreen use. Health Psychology, 27(6), 770–779. doi:10.1037/0278-6133.27.6.770

Orbell, S., Perugini, M., & Rakow, T. (2004). Individual differences in sensitivity to health communications: Consideration of future consequences. Health Psychology, 23(4), 388–396. doi:10.1037/0278-6133.23.4.388

Rappange, D. R., Brouwer, W. B., & Van Exel, N. J. A. (2009). Back to the consideration of future consequences scale: Time to reconsider? Journal of Social Psychology, 149(5), 562–584. doi:10.1080/00223980.1985.9915469

Rhodes, R. E., de Bruijn, G. J. (2010). Automatic and motivational correlates of physical activity: Does intensity moderate the relationship? Behavioural Medicine, 36(2), 44–52. doi:10.1080/08964281003774901

Rhodes, R. E., & Home, L. (2013). Deepening the measurement of motivation in the physical activity domain: Introducing behavioural resolve. Psychology of Sport and Exercise, 14(4), 455–460. doi:10.1016/j.psychsport.2012.12.010

Rhodes, R. E., & Matheson, D. H. (2005). Discrepancies in exercise intention and expectation: Theoretical and applied issues. Psychology & Health, 20(1), 63–78. doi:10.1080/0887044041231296071

Rhodes, R. E., Plotnikoff, R. C., & Courneya, K. S. (2008). Predicting the physical activity intention-behaviour profiles of adopters and maintainers using three social cognition models. Annals of Behavioral Medicine, 36(3), 244–252. doi:10.1007/s12160-008-9071

Rogers, R., & Prentice-Dunn, S. (1997). Protection motivation theory. In D. Gochman (Ed.), Handbook of health behaviour research 1: Personal and social determinants (pp. 113–132). New York, NY: Plenum Press.

Rothman, A., & Salovey, P. (1997). Shaping perceptions to motivate healthy behaviour: The role of message framing. Psychological Bulletin, 121, 3–19. doi:10.1037/0033-2909.121.1.3

Sheeran, P. (2002). Intention-behaviour relations: A conceptual and empirical review. European Review of Social Psychology, 12(1), 1–36. doi:10.1080/1479272143000003

Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S. (1994). The consideration of future consequences: Weighing immediate and distant outcomes of behaviour. Journal of Personality and Social Psychology, 66(4), 742–752. doi:10.1037/0022-3516.64.4.742

Stroebe, W., van Koningsbruggen, G. M., Papies, E. K., & Aarts, H. (2013). Why most dieters fail but some succeed: A goal conflict model of eating behaviour. Psychological Review, 120(1), 110–138. doi:10.1037/a0030849

Suresh, K. (2011). An overview of randomization techniques: An unbiased assessment of outcome in clinical research. Journal of Human Reproductive Sciences, 4(1), 8–11. doi:10.4103/0974-1208.82352

Trope, Y., & Liberman, N. (2003). Temporal construal. Psychological Review, 110(3), 403–421. doi:10.1037/0033-295X.110.3.403

Van Assema, P., Martens, M., Ruitter, R. A., & Brug, J. (2001). Framing of nutrition education messages in persuading consumers of the advantages of a healthy diet. Journal of Human Nutrition and Dietetics, 14 (6), 435–442. doi:10.1046/j.1365-277X.2001.00315.x

Van’t Riet, J., Ruitter, R., & De Vries, H. (2012). Preaching to the choir? The influence of personal relevance on the effects of gain- and loss-framed health-promoting messages. Journal of Health Psychology, 17 (5), 712–723. doi:10.1177/1359105311421047

Van’t Riet, J., Ruitter, R. A. C., Werrij, M. Q., Candel, M. J. J. M., & De Vries, H. (2010). Distinct pathways to persuasion: The role of affect in message-framing effects. European Journal of Social Psychology, 40 (7), 1261–1276. doi:10.1002/epsj.72

Warshaw, P. R., & Davis, F. D. (1985). The accuracy of behavioural goals. In S. T. Fiske (Ed.), Social cognition (pp. 750–779). New York, NY: Plenum Press.

Webb, T. L., & Sheeran, P. (2006). Does changing behavioural intentions engender behaviour change? A meta-analysis of the experimental evidence. Psychological Bulletin, 132(2), 249–268. doi:10.1037/0033-2909.132.2.249

White, K., MacDonnell, R., & Dahl, D. W. (2011). It’s the mind-set that matters: The role of construal level and message framing in influencing consumer efficacy and conservation behaviours over the long-term. Journal of Marketing Research, 48(3), 472–485. doi:10.1509/jmkr.48.3.472

Williams, D. M., & Rhodes, R. E. (2016). The confounded self-efficacy construct: Conceptual analysis and recommendations for future research. Health Psychology Review, 10(2), 113–128.

World Health Organization. (2003). Diet, nutrition and the prevention of chronic diseases: Report of a joint WHO/FAO expert consultation (Vol. 916). Geneva, Switzerland: Author.

Zaichkowsky, J. L. (1985). Measuring the involvement construct. Journal of Consumer Research, 12, 341–352. doi:10.1086/jcr.1985.12.issue-3
### Gain-Framed Message With Short-Term Outcomes

**Heading**: The immediate positive consequences of eating at least two pieces of fruit per day.

Substantial national and international research shows that eating at least two pieces of fruit per day has an immediate positive effect on your health. Below, we have listed several of these advantages.

1. An immediate decrease in craving for unhealthy in-between meal snacks
2. Instantly feeling better
3. At once, being more resistant against flu and illness.

### Gain-Framed Message With Long-Term Outcomes

**Heading**: The positive consequences of eating at least two pieces of fruit per day for when you are older.

Substantial national and international research shows that eating at least two pieces of fruit per day has an positive effect on your health at an older age. Below, we have listed several of these advantages.

1. You will have a decreased odds for being overweight at an older age.
2. You will have decreased your risk for cardiovascular diseases for when you are older.
3. You will have decreased your risk for various cancers later on in your life.

### Loss-Framed Message With Short-Term Outcomes

**Heading**: The immediate negative consequences of not eating at least two pieces of fruit per day.

Substantial national and international research shows that not eating at least two pieces of fruit per day has an immediate negative effect on your health. Below, we have listed several of these disadvantages.

1. An immediate increase in craving for unhealthy in-between meal snacks
2. Instantly feeling worse.
3. At once, being less resistant against flu and illness.

### Loss-Framed Message With Long-Term Outcomes

**Heading**: The negative consequences of not eating at least two pieces of fruit per day for when you are older.

Substantial national and international research shows that not eating at least two pieces of fruit per day has an negative effect on your health at an older age. Below, we have listed several of these disadvantages.

1. You will have an increased odds for being overweight at an older age.
2. You will have increased your risk for cardiovascular diseases for when you are older.
3. You will have increased your risk for various cancers later on in your life.

### Manipulation Check Items

**Message Frame**: Did the message highlight positive or negative consequences of eating (loss frame: not eating) of least two pieces of fruit per day? +3 = very positive; –3 = very negative

**Temporal Context**: Did the message emphasize short-term or long-term consequences of eating (loss frame: not eating) of least two pieces of fruit per day that could happen? +3 = very definitely short-term; –3 = very definitely long-term