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**When is congruency helpful? Interactive effects of frame, motivational orientation
and perceived message quality on fruit and vegetable consumption**

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Abstract

Health messages framed to match peoples' motivational orientation are generally more effective in promoting health behavior change, but some inconsistencies have been found. This study aimed to test whether the perceived quality of a health message may be a moderator of the congruency effect. Undergraduate participants ($N = 109$) read a health message promoting fruit and vegetable (FV) intake in which the frame (gain vs. loss) was either congruent or incongruent with their motivational orientation. Perceived message quality and intention to increase FV intake were assessed after message exposure, and self-reported FV intake was assessed one week later. Effects for congruency were not found, but significant interactions between congruency and perceived message quality were found for intention and FV intake. When messages were congruent, higher intentions and FV intake were observed when perceived message quality was high, but the reverse pattern was observed when perceived message quality was low. A mediated moderation model suggested that intention mediated the interaction between congruency and perceived message quality on fruit and vegetable intake. Only when the quality of a message is strong does matching the frame of a message to the recipient's motivational orientation increase adherence to health behaviors such as FV intake.

Keywords: Persuasive communication; Message framing; Motivational orientation; Perceived message quality; Fruit and vegetable intake.

When is congruency helpful? Interactive effects of frame, motivational orientation and perceived message quality on fruit and vegetable consumption

Health communications intended to change health behaviors, such as fruit and vegetable intake, often emphasize the consequences of adherence or non-adherence (Michie et al., 2013). These consequences can be communicated with either a gain or a loss frame. A gain-framed message stresses the positive consequences of change, e.g., "*if you eat five or more portions of fruit and vegetables a day you will be protected against several diseases*", whereas a loss-framed message stresses the negative consequences of failing to implement such changes, e.g., "*if you do not eat five or more portions of fruit and vegetables a day you will be at risk for several diseases*".

A large body of research identifies the circumstances under which a certain frame is more effective in promoting healthy behavior (for reviews see Rothman & Updegraff, 2011; Updegraff & Rothman, 2013). One relatively robust finding is that individual differences in motivational orientation moderate the relative effectiveness of gain- and loss-framed messages (Covey, 2014, Godinho, Alvarez, & Lima, 2016). Individual differences in motivational orientation include differences in approach or avoidance tendencies, i.e., predominance of behavioral activation system or the behavioral inhibition system (e.g., Mann, Sherman, & Updegraff, 2004; Updegraff, Sherman, Luyster, & Mann, 2007) and in the end-states to which people self-regulate their own behavior, i.e., promotion or prevention regulatory focus (e.g., Higgins, 1997; Latimer et al., 2008; Sasaki & Hayashi, 2015). Among individuals primarily oriented towards achieving the presence of positive outcomes (i.e., approach-oriented and promotion oriented individuals), a gain frame is generally more effective, whereas for individuals primarily oriented towards avoiding the presence of negative outcomes (i.e., avoidance-oriented and prevention-focused individuals), a loss frame is generally more effective

(e.g., Mann et al., 2004). This pattern has been called the *congruency effect*, as it refers to the increased effectiveness of a health message when the gain vs. loss frame is congruent with the recipient's motivational orientation.

The congruency effect has been demonstrated in the context of a variety of behaviors, including flossing (e.g., Mann et al., 2004; Uskul, Sherman, & Fitzgibbon, 2009) and human papillomavirus vaccination (Gerend & Shepherd, 2007), suggesting that using congruently-framed messages is a useful strategy for promoting adherence. Despite these generally supportive findings (Covey, 2014), some issues remain unclear. For example, some studies have not found support for the congruency effect (e.g., Meyers, 2010), and the most robust evidence for this effect comes from studies on dental flossing. Even in the context of dental flossing, some boundary conditions of the congruency effect have been noted (Updegraff et al., 2007), for example, showing that it appears only when the underlying arguments are strong. Thus, additional research is needed to further identify the boundary conditions of the congruency effect, both by examining it in a behavioral domain in which it has not previously been studied – such as fruit and vegetable consumption – and also by testing whether message quality might moderate the effect of congruency on intentions and behavior.

Message quality and the congruency effect

We propose that the effectiveness of using congruently-framed health messages rests on the message having perceived high quality. Most of the research conducted on message quality has used the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986) as a theoretical backdrop. According to the ELM, high message elaboration occurs whenever the receiver is both motivated to process the content of the message and has the ability to do so (Petty, Barden, & Wheeler, 2002). It has been proposed that the effect of matching the content of a message to the individuals' characteristics – such

as presenting a message that is congruently framed with the recipient's motivational orientation – may increase the recipient's ability and/or motivation to process the message more thoroughly (Dimmock, Jackson, Clear, & Law, 2013; Updegraff et al., 2007).

The ELM also predicts that when people are relatively thoughtful in their consideration of the information presented in the message (i.e., under high elaboration conditions), the quality of the message will influence the attitude towards the topic, with high quality messages leading to more persuasion than low quality messages (Petty, Cacioppo, & Goldman, 1981). In the context of nearly all ELM-based research, message quality has referred to the strength of a message's underlying arguments: high quality representing strong arguments, and low quality representing weak arguments. One study in the domain of oral health behaviors showed that when people read health messages framed to be congruent with their motivational orientation, they were more sensitive to an argument quality (i.e., argument strength) manipulation than when the message frame was incongruent with motivational orientation (Updegraff et al., 2007). Thus, it was concluded that congruency should only promote persuasion and behavior change when message quality is high. When message quality is low, congruency may lead to reduced persuasion.

However, persuasion is dependent upon the context, and it is hard to establish rules for developing arguments that will be systematically viewed as strong across contexts (Petty & Wegener, 1998). Message recipients may perceive a message as being high or low quality due to factors other than the strength of the underlying arguments. These factors include perceived identification, perceived informativeness, and perceived realism (Cho & Boster, 2008), and variability exists in the degree to which people may evaluate the quality of persuasive messages (e.g., Lavine & Snyder, 1996; Snyder &

DeBono, 1985). In the context of health message framing, and in line with the results of previous research (Updegraff et al., 2007), we anticipate that perceived message quality should moderate the influence of framed messages on the outcomes that matter most in health behavior research: intentions to adhere, and subsequent adherence behavior.

When messages are perceived as having good quality, congruency should lead to greater persuasion: in a health context, this should translate into higher intentions to adhere to a health behavior and greater adherence. In contrast, when messages are perceived as being of relatively low quality, congruency should have no influence on persuasion, or worse, a detrimental influence on persuasion. In short, we predict that perceived message quality acts as a moderator of the influence of congruency on intention and behavior, and should emerge as an important boundary condition for the congruency effect.

Aims of the study

The purpose of this study was twofold. First, we sought to examine the utility of using congruently-framed messages to promote fruit and vegetable consumption, a health behavior for which the congruency effect has not yet been demonstrated. Like dental flossing, fruit and vegetable consumption is a behavior that must be performed daily, for which people often show less than recommended levels of adherence, and also one in which dispositional factors are known to shape people's response to persuasive messages (e.g., Latimer, Katulak, Mowad, & Salovey, 2005). Second, we sought to shed light on some inconsistencies in the literature by examining the role that perceived message quality plays in message framing effects such as the congruency effect.

Method

Participants

One hundred and twenty-seven university students enrolled in the study. Fourteen did not complete the follow-up questionnaire and another four were excluded from the analysis for being allergic or having medical restrictions concerning the eating of fruit and/or vegetables. This resulted in a final, longitudinal sample of 109 students, who received course credit for participation. Participants' age ranged from 16 to 46 years ($M = 19.59$; $SD = 3.59$) and 75 (70.1%) were women.

Procedure

After providing informed consent, participants first reported whether they had any restrictions related to fruit and vegetable intake and replied to measures assessing their motivational orientation, and past fruit and vegetable intake in an online survey. At least one week later, participants came into the lab individually and were randomly assigned to read either a loss or gain framed message promoting fruit and vegetable intake. After the message, participants reported their intention towards eating more fruit and vegetables in the following week. Participants then completed the manipulation check measures, rated the message's quality and provided some social-demographic information. One week after this experimental session, participants received an e-mail with a link to the final online questionnaire that assessed their fruit and vegetable intake over the previous week.

Measures

Motivational orientation. The BIS/ BAS scale (Carver & White, 1994) was used to assess participants' motivational orientation. The scale is composed of 20 items, 13 assessing approach motivations (BAS, i.e., the desire to approach positive occurrences; Cronbach's $\alpha = .80$), and the other seven assessing avoidance motivations (BIS, i.e., the sensitivity and concern with the occurrence of unpleasant events; Cronbach's $\alpha = .75$). Agreement to items was rated on a 4-point scale ranging from 1 ("very false for me") to

4 (“very true for me”). Motivational orientation was determined by subtracting the subject’s mean score in BIS from the mean score obtained in BAS, resulting in a measure of whether a person was predominantly approach or avoidance-motivated, which varied between -3 and 3, with negative values representing avoidance and positive values representing approach.

Perceived message quality. Perceptions about message quality were assessed by three items (Cronbach’s $\alpha = .86$) used in Updegraff and colleagues (2007): “*what is your overall opinion about the message*”, “*how credible do you think the message was*” and “*would you recommend that the message be used in a public service announcement*”. Answers were given on 7-point scale ranging from 1 (“very negative”/ “not credible at all” / “definitely not recommend”) to 7 (“very positive” / “completely credible” / “definitely recommend”).

Intention. Intention to eat daily recommended portions of fruit and vegetables was assessed by three items (Cronbach’s $\alpha = .87$) presented in Updegraff and colleagues (2007): “*Do you intend to eat five or more portions of fruit and vegetables a day?*”, “*Will you try to eat five or more portions of fruit and vegetables a day?*”, “*Are you planning to eat five or more portions of fruits and vegetables a day?*”. Response options ranged from 1 (“not at all”) to 7 (“very much”).

Manipulation check. Two items (Cronbach’s $\alpha = .70$) similar to those reported by Rothman, Martino, Bedell, Detweiler and Salovey (1999) were used to evaluate the success of the framing manipulation. The first item was “*How would you describe the message in terms of the tone of the information presented?*” with response options ranging from -4 (“mostly negative”) to +4 (“mostly positive”). The second item was “*You would say that the message mostly emphasized...*” and answers were given on a

scale ranging from -4 (“the problems of not eating fruits and vegetables”) to +4 (“the benefits of eating fruits and vegetables”).

Fruit and vegetable intake. Fruit and vegetable intake was measured twice with items described in Luszczynska, Tryburcy and Schwarzer (2007): “*Within the last two weeks (T1) / last week (T3), how often have you eaten a portion of fruit and / or vegetables (excluding potatoes)?*”. Several examples of what a portion of fruit and vegetables could be were given, such as “*one cup of raw leafy vegetables*” or “*one medium apple, banana, orange, pear*”. A similar measure has been validated against dietary biomarkers and food frequency questionnaires (Steptoe et al., 2003). Responses were given in a scale ranging from 1 (“once per day or less”) to 7 (“more than four times a day”).

Materials

The gain-framed message explained the positive effects of eating at least 5 portions of FV a day, whereas the loss-framed message presented the negative effects of not eating this same amount of FV (see Table 1)¹. Messages were presented in a 2-minute video format, with the text presented on a computer screen accompanied by voice narration, in order to insure that all participants received the message in full (see Appendix for full text).

¹ Although regulatory focus theory (Higgins, 1997) was not the focus of the present study, the messages were prepared in order to address some issues highlighted by the theory. One issue is the disentangling between the *presence* of a reward and the *absence* of an aversive outcome (both *gains*) and between the *presence* of an aversive outcome or the *absence* of a reward (both *losses*). To keep the presentation of information constant, the messages only referred to the *presence* of rewarding vs. aversive outcomes, while referring to the exact same consequences (i.e., same consequences framing, see Rothman & Salovey, 1997). Moreover, the messages controlled for the fact that some outcomes might be considered intrinsically promotional (e.g., being attractive), while others may be considered intrinsically preventive (e.g., having better health), by balancing the number of each type of outcomes.

Analytic strategy

Prior to testing the study hypotheses, an analyses of variance (ANOVA) and a chi-square test were performed in order to insure that no significant differences in the studied variables existed between those who completed the study and those who dropped out.

In order to test whether perceived message quality moderates the effect of congruency on intention and fruit and vegetable intake, two hierarchical regressions were performed. Baseline fruit and vegetable intake was included in the first step of both regressions to account for pre-existing differences in intake. As in prior studies (e.g., Mann et al., 2004), the congruency effect was represented by an interaction between message frame and motivational orientation. The hypothesized moderation of the congruency effect by perceived message quality was tested through the three-way interaction (i.e., message frame x motivational orientation x perceived message quality). It was predicted that higher perceived message quality leads, by itself, to higher intention and fruit and vegetable intake. No specific hypotheses were held for the main effects of the other two predictors, or for the second-order interactions. Nonetheless, all were included in the model to ensure that the hypothesized three-way interaction was not dependent upon it.

Prior to analysis, the message frame variable was dummy-coded (with 0 for loss- and 1 for gain-frame). The three variables were entered at step two as independent predictors in the regressions. The two-way interaction terms were entered at step three and finally the three-way interaction at step four. Considering that reduced power is associated with higher-order interaction terms (Aiken & West, 1991), and that the direction of the 3-way interaction was theoretically predicted, the significance of this

interaction was determined through a one-tailed test. All other reported p -values were two-tailed.

To simplify the interpretation of any significant three-way interactions, a categorical variable representing congruency (0 = incongruent; 1 = congruent) was created, referring to whether the message frame was congruent (vs. incongruent) with participants' motivational orientation. Pairwise comparisons (LSD) were then performed, examining the simple effects of congruency among those perceiving low message quality (-1SD) and high message quality (+1SD), while controlling for baseline fruit and vegetable intake.

Finally, a mediated moderation model was tested using PROCESS macro (Model 7; Hayes, 2013). Intention was defined as the mediator between congruency (defined as a categorical variable) and fruit and vegetable intake, with perceived message quality moderating the relationship between congruency and intention.

Results

Manipulation and randomization check

As expected, the gain-framed message was perceived as being more positive in tone ($M = 2.64$; $SD = 1.39$) than the loss-framed message ($M = 0.71$; $SD = 2.35$), $F(1, 106) = 27.59$, $p < .001$, and as mostly emphasizing the benefits of fruit and vegetable consumption ($M = 2.43$; $SD = 1.54$), while the loss-framed message emphasized the costs of not eating fruit and vegetables ($M = -0.46$; $SD = 2.18$), $F(1, 106) = 63.38$, $p < .001$. No other differences were found between the gain vs. loss frame conditions in baseline fruit and vegetable intake, age and gender (all p 's $> .10$), attesting the success of the randomization procedures.

Descriptive statistics and dropout analyses

Inter-correlations, means and standard deviations for all study variables are shown in Table 2. Analyses of variance (ANOVA's) showed no significant differences on motivational orientation, perceived message quality, intention, baseline fruit and vegetable intake and age between the longitudinal sample and those who dropped out (all p 's > .27), and a chi-square test revealed no gender differences between the groups.

Perceived Message Quality

As shown in Table 2, perceptions of message quality were generally positive ($M = 5.19$, $SD = 1.32$) but ranged considerably (minimum = 1.67, maximum = 7). Message quality was not related to any baseline measures including motivational orientation (see Table 2). Participants perceived the gain-framed message to be of higher quality ($M = 5.62$, $SD = 1.15$) than the loss-framed message ($M = 4.76$, $SD = 1.31$), $p < .001$.

However, there was no significant congruency effect on perceptions of argument quality, as the frame x motivational orientation interaction on message quality was not significant ($\beta = .03$, $p = .83$). Thus, perceptions of message quality were uncorrelated with congruency. Given that perceived message quality was unrelated to congruency, it allowed us to examine the extent to which message quality might moderate the influence of the congruency effect on intentions and behavior.

Intention for fruit and vegetable intake after message exposure

Baseline fruit and vegetable intake, entered in the first step of the hierarchical regression, was a significant predictor of intention after message exposure ($\beta = .30$, $p < .001$), and explained 7.3% of its variance. In the second step, message frame, motivational orientation and perceived message quality explained 27.4% of the variance on intention, $\Delta F(3, 101) = 9.36$, $p < .001$. Inspection of the individual contributions of each variable revealed, as expected, a significant and positive effect of perceived message quality on intention ($\beta = .42$, $p < .001$). However, the three-way interaction

was also significant ($\beta = .29, p = .02$), suggesting that the joint influence of message frame and motivational orientation depended on perceived quality of the message. The inclusion of this third-order interaction contributed significantly to the prediction of intention, $\Delta R^2 = .03, \Delta F(1, 97) = 4.11, p = .046$, explaining an additional 2.2% of variance.

Congruency, when represented as a categorical variable, was again unrelated to perceived message quality, $t(107) = 1.29, p = .20$, again allowing us to examine message quality as a moderator of congruency on intention. As hypothesized, this categorical congruency variable significantly interacted with perceived message quality to predict intention ($\beta = .26, p = .03$). As Figure 1 shows, perceived message quality had an effect on intention for both congruent and incongruent groups. However, as expected, the difference between low and high message quality was more pronounced in the congruent ($M = 5.91; SE = .37$ vs. $M = 3.71; SE = .40, p < .001$) than in the incongruent conditions ($M = 5.56; SE = .48$ vs. $M = 4.20; SE = .42, p = .04$), suggesting that when the message frame is congruent with motivational orientation, persuasion is more dependent on perceived message quality.

Fruit and vegetable intake during the following week

As would be expected, baseline fruit and vegetable intake significantly predicted intake at the one-week follow-up ($\beta = .30, p < .001$; 26.7% variance explained). Importantly, the three independent variables entered in step two jointly explained additional variance in follow-up intake, $\Delta F(3, 102) = 3.21, p = .03$. Of these three predictors, only motivational orientation was a significant independent predictor ($\beta = 0.21, p = .01$), and the second-order interactions entered at step three did not significantly explain fruit and vegetable intake, $\Delta F(3, 99) = 0.39, p = .76$. As hypothesized, the three-way interaction between message quality, frame and

motivational orientation was significant and positive ($\beta = .29, p = .04$). With its inclusion, 36% variance of fruit and vegetable intake was explained, $\Delta R^2 = .02$, $\Delta F(1, 98) = 3.35, p = .07$. Thus, the effect of congruency on fruit and vegetable intake depended upon perceived message quality.

When representing congruency as a categorical variable, its interaction with perceived message quality was likewise significant ($\beta = .28, p = .01$). Figure 2 depicts the interaction between congruency and perceived message quality. As hypothesized, when frame was incongruent with own motivational orientation, no effect of perceived message quality was found on fruit and vegetable intake ($M = 2.93; SE = .41$ vs. $M = 2.44; SE = .44, p = .42$). However, when frame was congruent, perceived message quality exerted a positive influence, with those perceiving higher quality reporting higher fruit and vegetable intake ($M = 3.45; SE = .36$) than those who perceived lower quality ($M = 2.18; SE = .39, p = .02$).

Mediation analyses

Findings thus show that message quality moderated the influence of congruency effect on the outcomes of both intentions and behavior, suggesting that intentions could plausibly have mediated the joint influence of message quality and congruency on behavior. Therefore, we specifically tested this mediated moderation model. At low levels of perceived message quality (i.e., values at one standard deviation below the mean), the hypothesized mediated moderation effect was found (Figure 3), with a negative significant indirect effect of congruency on fruit and vegetable intake through intention emerging, $\beta_{\text{Indirect effect}} = -.11$, 95% CI $[-.22; -.03]$. Put simply, when people perceived the message as being of poor quality, the congruency effect was conducive to lower intentions and, consequently, to lower fruit and vegetable intake, as expected. However, at high levels of perceived message quality (i.e., values at one standard

deviation above the mean) the indirect effect of congruency on fruit and vegetable intake through intention was non-significant $\beta_{\text{Indirect effect}} = .05$, 95% CI [-.02; .15].

Discussion

A growing body of literature attests the effectiveness of matching a health message's frame to individuals' motivational orientation (Updegraff & Rothman, 2013). However, these congruency effects have not always been obtained (Covey, 2014), underscoring the need to identify boundary conditions of the congruency effect. The present study sought to test whether perceived message quality may impose limits to the effectiveness of congruently framed messages, while also examining the extent to which the congruency effect could apply to the domain of fruit and vegetable intake.

As hypothesized, perceived message quality had an impact on congruency, both for intention immediately after message exposure, as well as for fruit and vegetable intake a week further. Across both intentions and self-reported intake, congruency had more positive influence on persuasion when perceived message quality was high rather than low. Therefore, when the message was congruent with recipients' dispositions, people appeared to be more sensitive to the perceived quality of the message, showing higher intentions and higher fruit and vegetable intake when they perceived the message to be of high quality. Conversely, lower perceived message quality led to lower intentions, which carried over to fruit and vegetable intake a week later. In other words, when the message was perceived of being of lower quality, congruency was *counterproductive*, leading to lower levels of fruit and vegetable intake. Furthermore, we found that this effect on behavior was mediated by intentions, when perceived message quality was low. Under these circumstances, congruency interacted with perceived message quality to determine peoples' intentions after message exposure, that then translated into fruit and vegetable intake as reported a week later.

The major implication of the present findings is that attention should be paid to message quality when trying to predict congruency effects on intention and behavior. Even in cases where message quality is not explicitly manipulated as through an argument strength manipulation (cf. Updegraff et al., 2007), variability in peoples' perceptions of message quality may be enough to augment or even reverse framing effects. Thus, measuring peoples' perceptions about message quality may help to disentangle effects that may have been obscured in previous research.

These results may be due to several possible mechanisms. As suggested by Updegraff and collaborators (2007), the fact that people were more sensitive to message quality when messages were congruently framed supports the notion that the congruency effect may be driven, in part, by increased elaboration of a health message. Elaborating on a strong message increases persuasion. Conversely, elaborating on a weak message decreases persuasion. Alternately, it is also possible that people "feel right" (Cesario, Grant, & Higgins, 2004) about their reactions to congruently-framed messages, which in turn could lead to the observed effects. Feeling right about one's positive reaction to a message increases persuasion, while feeling right about one's negative reaction to a message decreases persuasion. Thus, two theoretical perspectives support the observed role of message quality as a moderator of framing effects on adherence behavior, but further research is needed to test these possibilities against each other. However, our findings do show that a future research that identifies the mechanisms that underlie message congruency effects is a critically important direction for future work, as it can help identify the contexts in which congruency may promote persuasion and behavior change, as well as the contexts where it will likely not.

The fact that the gain-framed message was perceived as being of higher quality is worthy of note. This may be explained by fruit and vegetable intake being possibly

conceived by our young adult sample as a behavior that serves promotion-oriented concerns such as accomplishment or vitality more so than prevention-oriented concerns such as safety or reduction of long-term health risks. As stressed by Rothman, Wlaschin, Bartels, Latimer and Salovey (2008), for behaviors that reflect promotion-oriented concerns, gain-framed messages may be perceived as having better “fit” and general appeal than loss-framed messages, leading to a tendency to evaluate the gain frame more positively than the loss frame for fruit and vegetable intake promotion. Alternatively, the loss-framed message may have evoked a greater sense of threat (e.g., Shen & Dillard, 2007) which may have led to greater message derogation by some participants, particularly those low in perceived self-efficacy (cf. Witte, 1992; van 't Riet, Ruiter, Verrij, & De Vries, 2010). However, we emphasize that although gain-framed messages were perceived as being of higher quality than loss-framed messages, there was no overall difference in their effect on either intentions or subsequent intake, underscoring the limits of using perceived message quality solely as a proxy for message effectiveness.

Some limitations of this study need to be mentioned. First, the sample was composed by young adults, most of whom were women, which may impose some limitations to the generalization of the present findings. Also, although our measure of fruit and vegetable intake has been validated in prior research (Steptoe et al., 2003), fruit and vegetable intake was assessed through self-report and may be subject to errors in recall. Message quality was measured rather than manipulated, so our study does not identify which ingredients make young adults perceive a message as having higher or lower quality. Nevertheless, the major contribution of our study is to show that, even when the underlying strength of the arguments is objectively the same, variation in peoples' perceptions of quality is still meaningful, and influences framing effects in a

manner consistent with explicit manipulations of argument strength (see Updegraff et al., 2007).

The present study makes two important contributions to the health communication and message framing literatures. First, it shows that matching the frame of a health message to people's motivational orientation is not a simple method that will always work, and reinforces the need to understand the exact circumstances under which congruency may improve adherence to health behaviors. Second, it shows that when the supporting message is perceived of generally high quality, congruency can promote increases in fruit and vegetable consumption. We also suggest that future researchers should evaluate peoples' perceptions of message quality, as it may help to resolve inconsistencies present in the literature on health message framing.

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Table 1.

Outcomes related to eating (or not) the recommended amount of FV referred in each message frame type.

Gain Frame	Loss Frame
Eating fruits and vegetables...	Not Eating fruits and vegetables...
their sufficient daily consumption can help prevent major diseases	their insufficient daily consumption can cause major diseases
Eating fruit and vegetables supplies vitamins and minerals	Not eating fruit and vegetables results in a lack of vitamins and minerals
you will be helping the immune system	you will be damaging the immune system
which works to keep you healthy and safe from such diseases	which will fail to keep you healthy and safe from such diseases
resulting in increased energy	resulting in decreased energy,
better moods	worse moods
an increased sense of well-being	a decreased sense of well-being
Having an adequate supply of these nutrients in the bloodstream is also important for maintaining attractive hair and skin	Not having an adequate supply of these nutrients in the bloodstream results in non-attractive hair and skin
promotes an active metabolism	promotes an inactive metabolism
which burns fat	which accumulates fat
contributing to an overall toned and attractive body	contributing to an overall untoned and unattractive body
Substantial positive effect on test performance and academic achievements	substantial negative effect on test performance and academic achievements
you will be proud of yourself for sticking to your goals	you will feel disappointed with yourself for withdrawing from your goals
you will be protected against disease	you will be unprotected against disease
you will feel good about yourself	you will feel bad about yourself
you will have better health	you will have worse health

Table 2.

Bivariate correlations between study variables and descriptive statistics.

	(1)	(2)	(3)	(4)	(5)	(6)	Mean	(SD)
1. Motiv. Orientation (T1)	1						0.15	(0.62)
2. P. Message Quality (T2)	.175	1					5.19	(1.32)
3. Intention (T2)	.172	.422**	1				5.03	(1.32)
4. FV intake (T1)	-.088	-.049	.266**	1			2.81	(1.38)
5. FV intake (T3)	.177	.123	.384**	.518**	1		2.91	(1.44)
6. Age (T1)	.180	-.011	.057	.209*	.234*	1	19.59	(3.59)

Table 3.

Hierarchical regressions of intention (Time 2)and fruit and vegetable consumption (Time 3) on message frame, motivational orientation and perceived message quality.

Outcome variable	Step	Variables entered	β (Step 1)	β (Step 2)	β (Step 3)	β (Step 4)	Semi-partial R^2
Intention (T2)	1	Baseline FV intake	.269***	.298***	.300***	.281***	.073
	2	Message Frame		-.083	-.090	-.123	.012
		MO		.138	.139	.167	.009
		P. Quality		.424***	.427***	.386***	.068
	3	Frame x MO			-.045	-.130	.005
		P. Quality x MO			.091	-.158	.007
		Frame x P. Quality			.011	.046	.001
	4	Frame x MO x P. Quality				.330**	.029
		R^2	.073	.274	.281	.310	
		ΔR^2	.073	.202	.007	.029	
FV Intake (T3)		ΔF	8.13***	9.36***	0.32	4.11**	
	1	Baseline FV intake	.517***	.546***	.535***	.519***	.248
	2	Message Frame		.024	.018	-.009	.000
		MO		.211**	.182	.207	.000
		P. Quality		.095	.042	.006	.014
	3	Frame x MO			-.004	-.080	.002
		P. Quality x MO			.065	-.157	.007
		Frame x P. Quality			.089	.124	.007
	4	Frame x MO x P. Quality				.292**	.022
		R^2	.267	.330	.338	.360	
		ΔR^2	.267	.063	.008	.022	
		ΔF	38.23***	3.21**	0.38	3.35**	

Note. Message frame is a dummy variable (0 = loss-frame; 1= gain-frame); MO = motivational orientation; P. Quality = perceived message quality; Semi-partial R^2 are presented for each predictor in the final model (Step 3).

* $p < .10$; ** $p < .05$; *** $p < .01$.

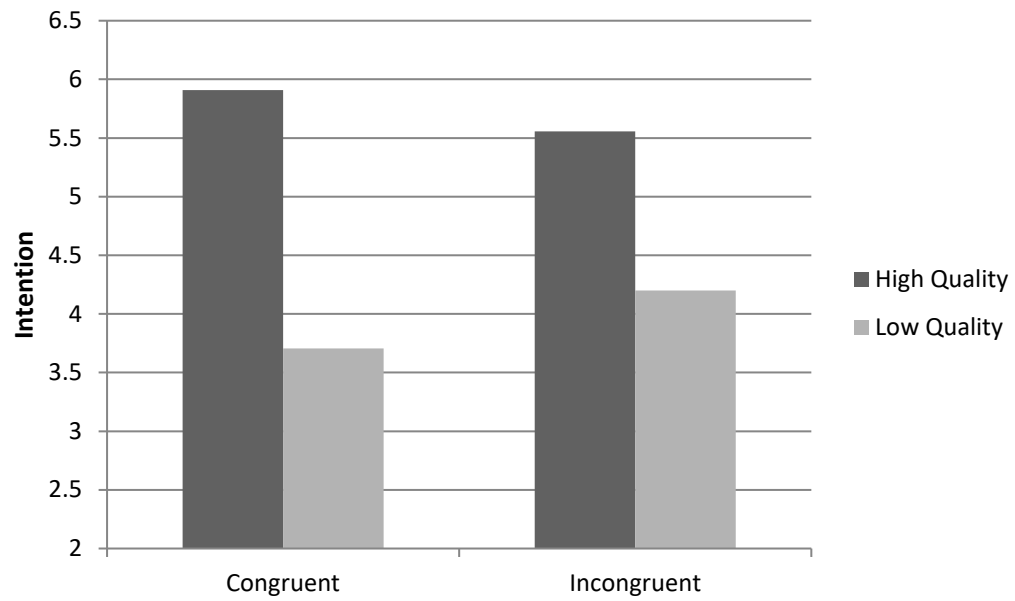


Figure 1. Estimated means of intention as a function of congruency and perceived message quality. Baseline fruit and vegetable intake was entered as covariate.

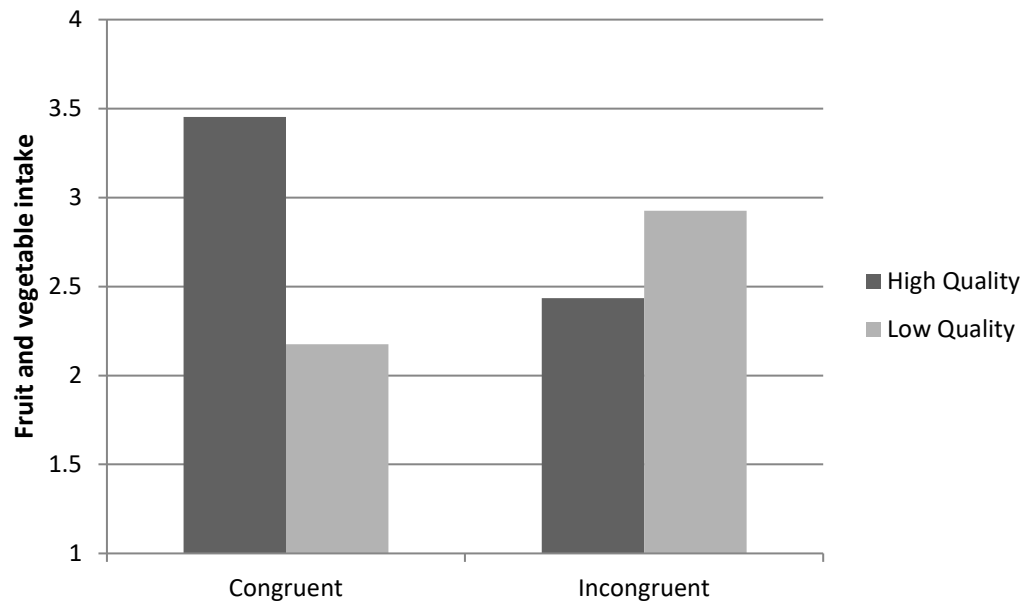


Figure 2. Estimated means of fruit and vegetable intake as a function of congruency and perceived message quality. Baseline fruit and vegetable intake was entered as covariate.

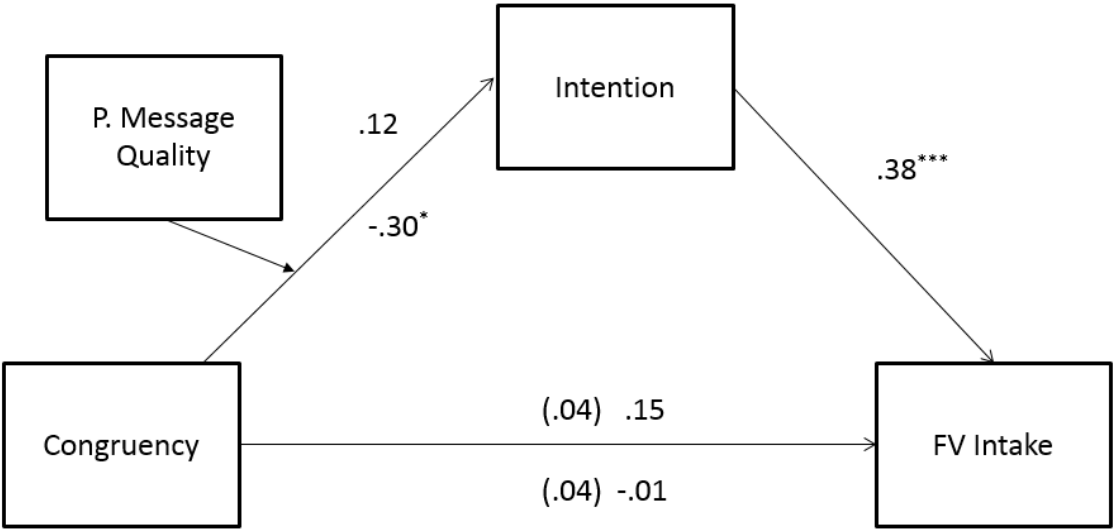


Figure 3. Moderated mediation model of the effect of congruency on fruit and vegetable intake through intention at high (values presented outside the figure) and low (values presented inside the figure) levels of perceived message quality.

Appendix.

Health message promoting fruit and vegetable intake (gain / loss frame).

The World Health Organization recommends a daily intake of at least 5 portions of fruit and vegetables. Fruit and vegetables are important components of a healthy diet, and their (sufficient/ insufficient) daily consumption can help (prevent/ cause) major diseases, such as cardiovascular diseases and certain cancers.

(Eating/ Not eating) fruit and vegetables (supplies/results in a lack of) vitamins and minerals that play a fundamental protective role in the body, and help to repair already damaged tissues. (If you eat/ If you do not eat) the recommended portions of fruit and vegetables (you will be helping/you will be damaging) the immune system, which (works/will fail) to keep you healthy and safe from such diseases.

Furthermore, (a balanced/ a non-balanced) diet that (is/is not) rich in fruit and vegetables has a direct effect on the brain, resulting in (increased / decreased) energy, (better/worse) moods and (an increased/ a decreased) sense of well-being. (Having/Not having) an adequate supply of these nutrients in the bloodstream (is also important for maintaining attractive/ results in non-attractive) hair and skin, and promotes an (active/inactive) metabolism, which (burns/ does not burn) fat, contributing to an overall (toned/ untuned) and (attractive/unattractive) body. Plus, (good nutrition/ bad nutrition), (rich/poor) in fruits and vegetables, can have a substantial (positive/negative) effect on test performance and academic achievements.

There have probably been times in the past when you have managed to eat 5 portions a day. This means that eating a sufficient amount of fruit and vegetables simply takes motivation and organization. If you (do it / do not do it) you will (be proud of / feel disappointed with) yourself for (sticking to /withdrawing from) your goals.

Eating 5 portions of fruit and vegetables a day is easy, and most of all it's tasty! If you (eat / do not eat) this amount of fruit and vegetables per day, you will be (protected / unprotected) against disease, you will feel (good/bad) about yourself and you will have (better/worse) health!