Chapter 3. Do Behavioral Health Intentions Engender Health Behavior Change? A Study on the Moderating Role of Self-Affirmation on Actual Fruit Intake Versus Vegetable Intake

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The aim of most health promotion campaigns is to change people’s perceptions of a specific unhealthy behavior with the ultimate aim of changing their behavior. In order to motivate people to adopt healthy lifestyles, health educators present them with information stressing an individual’s vulnerability to a health risk, the severity of this risk, or both (e.g., Witte & Allen, 2000). This message is then followed by a recommendation in which a solution to the health risk is presented. This recommendation is supposed to lead to behavior change. It appears, however, that people often process the information in a defensive manner in order to restore their emotional balance (e.g., Kunda, 1987; Liberman & Chaicken, 1992). Recent findings have shown a method to prevent this defensive information processing, namely, by the use of self-affirmation procedures. These procedures involve assignments that make people think about cherished values or attributes; these procedures cause an open-minded approach to the threatening health message (for overviews, see McQueen & Klein, 2006; Sherman & Cohen, 2006). For example, research has shown that self-affirmation leads to greater message acceptance and increased intentions to change behavior (e.g., Harris & Napper, 2005). However, many studies have failed to show that this accepting mindset and intention to change behavior lead to actual behavior change (e.g., Harris, Mayle, Mabbott, & Napper, 2007; Harris & Napper, 2005; Reed & Aspinwall, 2005). Only one study, by Epton and Harris (2008), showed that self-affirmation led to actual behavior change (i.e., increased fruit and vegetable consumption a week after reading a health message). That self-affirmation most often was not related to later behavior might be caused by the function of the intentions that follow persuasive messages including a self-affirmation procedure. That is, these intentions may have the function not of planning behavior but of coping with the negative emotions triggered by the persuasive information. The aim of the current study is to test whether intentions, formed after a self-affirmation procedure, predict actual behavior and, thus, can be regarded as real intentions. We aim to answer the question, “Do reactive intentions due to a self-affirmation procedure engender actual behavior change?” By focusing on the link between reactive intentions
and actual behavior, the current study has the potential to generalize previous findings on self-affirmation and intention; it is possible our findings show that the findings of previous experimental laboratory studies on intention have actual meaning because they link to people’s actual behavior.

**Self-Affirmation and Persuasion**

According to Self-affirmation Theory (Steele, 1988), people have a fundamental need to maintain a positive global self-image. Being reminded of negative, self-inflicted health risks could induce the conclusion that one’s actions are inconsistent and inadequate. This psychological state can be conceptualized as a self-threat (Dijkstra & Buunk, 2008; Steele, 1988; Stone & Cooper, 2001), which results in psychological discomfort that people are motivated to reduce. A common way to restore one’s self-image is by defensively processing threatening information – people reject, avoid, or deny the information presented to them. According to Self-affirmation Theory, however, people can also restore their self-integrity by means of self-affirmation. Self-affirmation refers to engaging in an activity that makes important values unconnected with the threatening event salient, or it involves reflecting on important aspects of one’s life that are irrelevant to the threat (McQueen & Klein, 2006). For example, self-affirmed participants in a study by Sherman, Nelson, and Steele (2000) wrote about important values. Self-affirmations satisfy people’s motivation to protect their self-worth, which results in an open-minded approach to threatening messages (e.g., Sherman & Cohen, 2006).

The main focus of self-affirmation research, in the context of health interventions, is on showing the positive effects of self-affirmation on persuasion (e.g., Sherman & Cohen, 2006). For example, Harris and Napper (2005) showed that self-affirmation procedures resulted in increased risk perceptions for the presented health risk (i.e., the negative consequences of excessive alcohol consumption). In addition, Sherman et al. (2000) showed that self-affirmation manipulations resulted in a stronger intention to change unhealthy behavior according to the recommendations made in the threatening
message. However, despite these promising effects, there is little evidence that these positive intentions translate into an increase in actual health behavior (Harris et al., 2007; Reed & Aspinwall, 1998). For example, Harris and Napper (2005) found no decrease in alcohol consumption one week or one month later. Only Epton and Harris (2008) found an effect of self-affirmation on actual behavior. These authors found that self-affirmed participants reported increased fruit and vegetable consumption one week after the self-affirmation procedure. In sum, the findings of most studies show that self-affirmation did lead to changes in intentions, but these intentions did not seem to lead to actual behavior. This raises the question of how realistic the intentions formed after self-affirmation are.

**Intentsions Versus Behaviors**

As mentioned above, according to Self-affirmation Theory (Steele, 1988), people experience a self-threat when they are confronted with negative outcomes they inflict on themselves. Reminders of negative self-inflicted outcomes make people feel inconsistent, inadequate, or non-adaptive. Basically, people are intrinsically motivated to restore their threatened self with whatever means they have at their disposal. One way people restore their self is by processing the information in a biased way. Such defensive processing has been shown to be a common reaction to persuasive health messages (e.g., Kunda, 1987; Liberman & Chaiken, 1992). Thus, defensive reactions are one way to restore the self. The findings of several studies have shown that a self-affirmation procedure prevents defensive reactions from taking place (for an overview, see Harris & Napper, 2005). Self-affirmation is thought to induce open-mindedness while the threat to the self remains. Self-affirmed people acknowledge the dangers and risks of their behavior more strongly; they become painfully aware of the negative outcomes (e.g., Harris et al., 2007) and probably of the self-threat (e.g., Sherman & Cohen, 2006). Thus, self-affirmation weakens defensive information processing, and as a result people have been shown to form intentions to change their behavior in the advocated direction (for an overview, see Harris & Napper, 2005).
These intentions may, however, be formed primarily with the function of self-restoration, just like the former defensive reaction, and not so much in order to actually avert the danger. There are indications that when peoples’ self-integrity is at stake they try to decrease the negative feeling not by handling the threat itself, but by handling only the negative emotions. For example, Kok, Ruiter, Van Den Hoek, Schaalma, and De Vries (2007) state that people report increased intentions to change behavior as an easy way to handle the uncomfortable feeling generated by the health message. In addition, Arndt, Schimel, and Goldenberg (2003) showed that people engage in self-esteem strivings following a threat to their self-integrity – people report increased intentions to act healthy, simply to uphold their self-esteem. But, again, people do not form an actual intention to change their behavior. The self may now be protected by false intentions aimed at short term relief from the self-threat. These reactive intentions may not be predictive of behavior, because the intentions are only aimed at generating a good feeling. Thus, the reactive intentions are not related to people’s behavioral system, and this might be a cause of the intention-behavior gap (Witte & Allen, 2000).

In the current research we aim to answer the question whether self-affirmation procedures create an intention that is predictive of actual health behavior. In answering this question, we confronted all participants with the possible negative outcomes they inflicted on themselves, applied a self-affirmation procedure in half of the participants, assessed the intentions in all participants, and determined whether these intentions predicted later behavior. In addition, involvement in the topic of persuasion was taken into account. Previous research has shown that involvement in the topic of persuasion determines whether or not information is processed defensively (e.g., Kunda, 1987; Liberman & Chaiken, 1992). Because self-affirmation procedures prevent defensive information processing, these procedures can only have an effect on intention when defensive processing is present.
Value-Involvement and Health Behaviors

The findings of many studies in the field of persuasive health communication have shown that involvement in the topic of persuasion influences defensive information processing (e.g., Ditto & Lopez, 1992; Harris & Napper, 2005; Kunda, 1987; Liberman & Chaiken, 1992). Therefore, involvement influences whether self-affirmation will have an effect on intention. In the current research we focused on a specific conceptualization of involvement, namely, value-involvement. Value-involvement is defined as the association between the topic of a persuasive message and one’s important values (e.g., Eagly, 2007; Johnson & Eagly, 1989). In the present domain of health, the value of health is central. The extent to which people value health outcomes will determine the extent of the self-threat they experience when they are confronted with (possible) self-inflicted negative outcomes. When it comes to the effects of a self-affirmation procedure, there are three possibilities.

First, when people attach low value to health, it is plausible that they will not experience a self-threat when confronted with possible negative outcomes. Because they do not value health outcomes greatly, self-inflicted negative health outcomes do not indicate a strong relevant inconsistency or inadequacy. Therefore, no defenses are raised and a self-affirmation procedure will have no effect. Secondly, when people do value health, as most people do, but not as a top priority, they will experience a self-threat that leads to defenses (for an overview, see Levin, Nichols, & Johnson, 2000). That is, these people may acknowledge the importance of health and they may be aware that unhealthy behavior is inconsistent with this value, but at the same time they may have values that prevent them from making health their top priority. For example, a smoker may value health but at the same time value the desired effects of smoking. This person will experience a self-threat, but will not restore his or her self-integrity by changing the unhealthy behavior. Instead, this person may want to preserve the unhealthy behavior and become defensive in order to restore the self; this can be prevented by a self-affirmation procedure. In this case, self-affirmation will have an effect; it is expected to increase intentions
compared to when there is no self-affirmation. Thirdly, people may value health very highly; health is their top priority (e.g., Solomon, Greenberg, & Pyszczynski, 2004). For people who perceive health as a top priority in life, the topic will be connected with self-defining goals (Brunstein, 2000; Brunstein & Gollwitzer, 1996). In that case, persuasive information that confronts them with possible negative outcomes is in line with their priorities in life. Research has shown that a self-defining goal results in a strong commitment that forces people to attain this desired identity (Brunstein & Gollwitzer, 1996), and does not lead to defensive or biased responses. People may experience a self-threat, but instead of reacting defensively they take the opportunity to form intentions in the advocated direction. Because no defenses are raised, self-affirmation will not make a difference.

In sum, especially in people who value health but not so much that they are willing do anything and take every opportunity to protect or increase their health, defensive reactions might be expected. However, defensive reactions may not always occur for this group. The occurrence of a defensive reaction is expected to depend on the difficulty of changing the health behavior: health behaviors that are less easy to engage in will activate stronger defensive reactions. Difficult behaviors provide a self-threat that is less easy to escape from. In this case changing habits is not an easy solution, thus people are almost forced to handle the self-threat by reacting defensively.

**Fruits Versus Vegetables**

In the current study we focused on two health behaviors that are expected to differ in level of difficulty of changing, namely, fruit versus vegetable consumption (Trudeau, Kristal, Li, & Patterson, 1998). Fruit is seen as easier to consume (it is sweet and needs almost no preparation), while vegetables are more difficult to consume (they are mostly bitter and require more preparation). Research has shown that only confrontation with difficult behaviors results in defensive information processing (Fry and Prentice-Dunn, 2005; Prentice-Dunn, Floyd, & Flournoy, 2001; Rippetoe & Rogers, 1987). This suggests that the ease of fruit intake prevents information defensiveness from
occurring; for vegetable intake these defensive responses are expected to be present. In the present research, we expect that a self-affirmation procedure has no effects on people’s fruit intake, because defensive information processing does not need to be diminished. Self-affirmation is expected to influence vegetable consumption.

We did not include separate measurements of people’s intention to eat fruits versus vegetables. Instead, we included a general measurement of people’s intention to eat fruits and vegetables. This was done to make our findings comparable with the results of previous research on fruit and vegetable intake, in which a combined measure of people’s intention to eat these healthy foods was used (e.g., Chatzisarantis, Hagger, Smith, & Phoenix, 2004; Gratton, Povey, & Clark-Carter, 2007; Kellar & Abraham, 2005; Lien, Lytle, & Komro, 2002; Povey, Conner, Sparks, James, & Shepherd, 1999). By combining a general measurement of intention with separate measurements of people’s actual fruit versus vegetable intake, we are also able to determine whether this commonly used measurement is sensitive enough to predict behavior at all, and whether it is predictive of only fruit or only vegetable consumption.

**What to Expect?**

In sum, we propose that self-affirmation will only have an effect when participants can be expected to react in a defensive manner; that is, when participants perceive the behavior as difficult (when they have to increase vegetable consumption) and when health is not a top priority in their lives (when they are moderately involved). Although it remains unclear whether intentions predict participants’ actual behavior, in the present study we expect to find an interaction between self-affirmation and involvement with respect to vegetable consumption. As argued above, in people who do value health, but for whom it is not a top priority, the relative difficulty of vegetable consumption will induce defensive reactions. Moreover, self-affirmation forces people to be open-minded, eliminating defensive information-processing reactions (Steele, 1988). Consequently, the self-threat becomes more salient as the information on the self-inflicted negative outcomes (the persuasive
Self-Affirmation and Health Behavior Change

health message) is processed unfiltered. This is expected to lead to an increase in vegetable consumption. For participants for whom health is a top priority we expect no effect of self-affirmation on vegetable consumption, because they will not react defensively to the persuasive health message. Instead, they are expected to take the opportunity to improve their health behavior, and report an increase in vegetable consumption. Concerning fruit consumption, we expect no defensive reactions. Thus, we do not expect to find an effect of self-affirmation. We do expect a general main effect of value-involvement (just as for vegetable consumption) – participants with a strong value-involvement are expected to have a more active commitment to attaining the desired goal, resulting in more fruit consumption.

Method

Recruitment, Procedure, and Design
The participants in this experimental study were students at the University of Groningen. The first administration of the questionnaire was completed during a mass paper-and-pencil testing session scheduled in the first week of the academic year. All first-year psychology students had to participate in this testing session in exchange for course credits. In total, 537 students (364 women, 109 men, 64 did not indicate gender) completed the pretest and immediate posttest. Participants were randomly assigned to one of two conditions (no self-affirmation vs. self-affirmation) of a between-subjects design. Following the self-affirmation manipulation, all participants were asked to read about the consequences of insufficient fruit and vegetable intake.

We aimed to assess the effects of both manipulations on multiple occasions. Therefore, participants were asked to complete two follow-up Internet questionnaires. In exchange for their participation they were offered the chance of winning one of 10 gift coupons, each worth 20 euros. The participants who were willing to complete the follow-up study received an email with a link to an Internet questionnaire exactly one week later. In total, 293 students (272 women, 54 men, 21 did not indicate gender) participated in the first follow-up questionnaire (one-
week posttest). Of these participants, a total of 261 students (197 women, 49 men, 15 did not indicate gender) completed the second follow-up (four-week posttest).

**Paper-And-Pencil Testing Session**

*Pretest measurements.* Participants answered a question aimed at assessing their value-involvement: “How important is health to you?” (endpoints 1 [*totally not important*] and 7 [*very important*]). Next, participants answered a detailed questionnaire about their fruit and vegetable consumption during the previous month (Bogers, Van Assema, Kester, Westerterp, & Dagnelie, 2004). The main vegetable categories were “cooked vegetables”, and “raw vegetables/salad”. The main fruit categories were “tangerines”, “oranges/grapefruits/lemons”, “apples/pears”, “bananas”, and “other fruits”. Participants were also asked about their “fruit and vegetable juice” intake. For each of the eight categories, participants were asked how often they ate or drank it during the previous month. The answer options ranged from “never or less than 1 day a month” (0), “1-3 days a month” (1), and “1 day a week” (2) to “7 days a week” (8). Six items were used as an indicator of average fruit and vegetable intake. We excluded tangerine consumption because this is a seasonal food which is not very easily accessible in the month this research was executed. We also excluded the category “fruit and vegetable juice” because this category did not enable us to distinguish between fruits and vegetables.

*Self-affirmation manipulation.* All participants were asked to perform a short writing exercise. They were presented with six values: theory, economics, aesthetics, social aspects of life, politics, and

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8 For each of the fruit and vegetable categories, participants were also asked to indicate how much of a product they took on average on a day when they ate or drank it. Portion sizes could be indicated in pieces (fruit), serving spoons (cooked vegetables), or glasses (fruit and vegetable juice). Or they could indicate that they consumed the product “never or less than 1 day a month”. However, we did not analyze the portion size, because the participants reported amounts that were too extreme, leading to many answers that were more than 3 standard deviations above the average. In addition, there were many missing values. Consequently, portion size as a dependent variable is too fluctuating and unpredictable (see also Spiegel, Grant-Pillow, & Higgins, 2004).
religion. Participants in the self-affirmation condition were asked to select one domain which they valued most and to write about that domain (maximum of 200 words). They were asked to consider the question, “Why is this domain important to you and how do you apply it in your daily life?” Participants were also asked, “Please indicate how this domain has influenced your behavior in specific circumstances.” Participants in the no self-affirmation condition were asked to choose the domain which was least valued by them. They were asked to answer the question, “Why would other students value this domain?”

Threat manipulation. Participants were presented with a text about the consequences of eating less than the daily-recommended amount of fruits and vegetables. The article was supposedly published in a scientific journal. The participants were told that the aim of the study was to determine their opinions on the article. The article comprised of two pages (total of 620 words). First, the relationship between fruits and vegetables, free radicals, and the immune system were addressed. Second, it was said that students who had unhealthy eating habits ran a higher risk of acquiring a variety of diseases. In addition, the participants were shown pictures of four diseases: fever, type 2 diabetes, skin cancer, and a tumor. The text made no distinction concerning the consequences of fruit versus vegetable intake.

Dependent measurements. Two questions were aimed at assessing participants’ intention to increase their daily fruit and vegetable intake: “Within the next six months I am planning to start a nutritious diet in which I will eat the daily-recommended amount of fruits and vegetables” (endpoints 1 [certainly not planning this] and 7 [certainly planning this]) and “It is likely that within the next six months I will start a nutritious diet in which I will eat the daily-recommended

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9 Previous research findings showed that the exact same message resulted in a significant self-threat. In this research we compared the threatening text about fruit and vegetable consumption to a neutral text about mustard. The results showed that participants who read the text about fruit and vegetable intake perceived the consequences of eating insufficient amounts of fruit and vegetables as being more severe than did the participants in the control condition. They also anticipated more negative consequences for insufficient fruit and vegetable intake than did the participants in the control condition.
amount of fruits and vegetables” (endpoints 1 [certainly not likely] and
7 [certainly likely]). A composite measurement was created ($r = .73$, $M = 5.16$, $SD = 1.35$).

**Manipulation check measurements.** Two items were included to
assess the effectiveness of the self-affirmation manipulation. Directly
after the self-affirmation manipulation, participants were asked “What
kinds of images about yourself popped into your mind while performing
the writing assignment?” (endpoints 1 [negative images] and 7
[positive images]). The second question was posed after the intention
questions. Participants were asked whether the writing assignment gave
them a good feeling about themselves (endpoints 1 [absolutely no
positive feeling] to 7 [very positive feeling]).

**One-Week Posttest and Four-Week Posttest**
Participants who indicated that they were willing to participate in a
follow-up questionnaire received an email with a link to an Internet
questionnaire. The first follow-up email was sent after 1 week (one-
week posttest) and the second email after 4 weeks (four-week
posttest). The average time between immediate and one-week posttest
was 9.11 days ($SD = 2.97$), and the average time between immediate
posttest and four-week posttest was 32.43 days ($SD = 4.22$). In both
follow-ups, participants answered the same fruit and vegetable
questionnaire as in the pretest.\(^{10}\)

**Results**

**Attrition Analyses**
Of the total of 537 participants who completed the pretest and the
immediate posttest, 45.4% did not participate in the one-week posttest.
The participants who did and those who did not participate in the one-
week posttest differed only in reported frequency of apple/pear
consumption measured at pretest ($M = 3.48$, $SD = 2.39$ and $M = 3.92$,

\(^{10}\) When we included day (the time between immediate posttest and one-week
posttest; the time between one-week posttest and four-week posttest) as a
covariate, all ANOVA’s remained unchanged. In addition, we did not find a main
effect of day on any of the fruit and vegetable categories measured at the one-
week posttest or at the four-week posttest.

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Inclusion of Participants
In the following analyses we included only the participants who completed the questionnaire at both the immediate posttest and the one-week posttest (N = 293).11 The analyses of health behavior measured in the four-week posttest were based on participants who completed the immediate posttest, the one-week posttest, and the four-week posttest (N = 261).

Randomization Check
Before analyzing the results of the 293 participants who participated in both the immediate posttest and the one-week follow-up, we checked whether they were randomly assigned to one of the two conditions. A one-way ANOVA with condition (no self-affirmation vs. self-affirmation) showed no differences in the amount of fruit and vegetable consumption at pretest (F < 1.2, n.s). Thus, randomization to condition appears to have been successful in respect to history of fruit and vegetable consumption.

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11 The pretest and the immediate posttest measurements consisted of a paper-and-pencil questionnaire. Some participants did not answer all the questions. Therefore, the exact number of participants may fluctuate slightly when analyzing the data.
Chapter 3

Manipulation Check of Self-Affirmation
A one-way ANOVA was conducted to test whether the self-affirmation manipulation was effective. As predicted, we found that self-affirmed participants had more positive self-images during the writing task ($M = 5.67$, $SD = 1.19$) than the non-affirmed participants ($M = 4.67$, $SD = 1.40$), $F(1, 288) = 42.73$, $p < .01$, $\eta_p^2 = .13$. Self-affirmation also gave participants a better feeling about themselves ($M = 4.99$, $SD = 1.08$) compared to the no-affirmation condition ($M = 4.26$, $SD = 1.12$), $F(1, 286) = 30.84$, $p < .01$, $\eta_p^2 = .10$.

Value-Involvement
The participants in our study valued health to a great extent. On a scale from 1 [totally unimportant] to 7 [very important] participants scored on average a 6.16 ($SD = 0.87$). Thus, the involvement data were negatively skewed (i.e., long tail to the left). Violations of normality lead to a degradation of findings. In this case, the chances of finding real differences are reduced, but the violation of normality does not lead to artifacts (Tabachnick & Fidell, 1996). However, data transformations to create a normal distribution hinder the interpretation of the data. We chose, therefore, to present the analyses based on the original data, and it is only mentioned when the transformed data resulted in different outcomes. The data transformation we used was $\log_{10}(8 - \text{value-involvement})$, which is the recommended data transformation for data with a substantial negative skewness (Tabachnick & Fidell, 1996).

Involvement was tested as a moderator. In the case of significant moderation, a high and a low involvement group were formed. A low group was modeled by subtracting one standard deviation (1 SD below the mean) from the standardized scores of involvement in the complete set of data. A high group was modeled by adding one standard deviation (1 SD above the mean) to the standardized scores of involvement in the complete set of data (Cohen, Cohen, West, & Aiken, 2003). However, given the high raw mean scores, the low group was actually a group with a moderate health value and the high group was the group with the highest health value.
The moderate group was conceptualized as valuing health, but not seeing health as a top priority. The highest group was conceptualized as valuing health as a top priority. We did not include a group of low-involved participants, because this level of involvement seemed almost absent in our sample (see the average level of involvement).

Involvement as a Moderator of the Effect of Self-Affirmation

The moderating role of involvement on the effects of self-affirmation was tested. Two-way analyses of variance were performed (ANOVA), with condition (no self-affirmation vs. self-affirmation) and involvement level as independent variables.

*Intention (immediate posttest).* We found a main effect of involvement on intention to eat fruit and vegetables, $F(1, 289) = 12.47$, $p < .01$, $\eta_p^2 = .04$. Moderately involved participants indicated a lower intention ($M = 4.99$) than did strongly involved participants ($M = 5.55$). In addition, we found an interaction between self-affirmation and involvement, $F(1, 289) = 4.83$, $p < .05$, $\eta_p^2 = .02$. To interpret this interaction, we computed simple slopes for the dependent variable at two different levels of the moderator. For moderately involved participants (-1 SD), we found that self-affirmation led to more persuasion ($M = 5.20$) than no affirmation ($M = 4.77$), $F(1, 289) = 3.70$, $p < .05$, $\eta_p^2 = .01$. As expected, there was no effect of self-affirmation for the strongly involved participants (+1 SD); $F(1, 289) = 1.59$, $p = .11$, $\eta_p^2 = .006$. The means were as follows: self-affirmation ($M = 5.41$) and no self-affirmation ($M = 5.69$).

As predicted, the results show that self-affirmation only influenced participants’ intention formation when they were moderately involved. For these participants, a self-affirmation procedure led to a stronger intention to change. When participants viewed health as a top priority they did not react in a defensive manner, and thus self-affirmation had no effect. In addition, we found a main effect of involvement; seeing health as a top priority resulted in a stronger...
intention to change. Next, we analyzed the effects of involvement and self-affirmation on actual behavior change.

**Vegetable consumption (one-week posttest).** We found a significant main effect of involvement on cooked vegetable consumption, $F(1, 289) = 5.03, \ p < .05, \ \eta^2_p = .02$. Participants who were strongly involved indicated that they ate more cooked vegetables ($M = 5.83$) than did moderately involved participants ($M = 5.33$). We also found a significant interaction, $F(1, 289) = 5.38, \ p < .05, \ \eta^2_p = .02$. For moderately involved participants we found, as predicted, that self-affirmation led to more cooked vegetable consumption ($M = 5.77$) than no self-affirmation ($M = 4.89$), $F(1, 289) = 8.30, \ p < .01, \ \eta^2_p = .03$. Again, in accordance with our expectations, we found that a self-affirmation procedure did not influence the consumption of cooked vegetable for strongly involved participants, $F(1, 289) = 0.23, \ p = .32, \ \eta^2_p = .001$. The means were as follows: self-affirmation ($M = 5.75$) and no self-affirmation ($M = 5.90$). Concerning raw vegetables/salad consumption we found no significant effects ($F < 1$, n.s.). Thus, the results show that self-affirmation also influences real behavior. Again, self-affirmation has an impact only when defensive processes can be expected that need to be eliminated; thus, when participants are moderately involved. But, does this effect remain after four weeks?

**Vegetable consumption (four-week posttest).** We found again a significant main effect of involvement on cooked vegetable consumption, $F(1, 257) = 7.18, \ p < .01, \ \eta^2_p = .03$. Strongly involved participants consumed more cooked vegetables compared to moderately involved participants. We did not find a significant interaction, $F(1, 257) = 1.56, \ p = .21, \ \eta^2_p = .006$. However, the contrasts were similar to those found for cooked vegetables measured at the one-week posttest; for moderately involved participants self-affirmation led to more vegetable intake compared to no-affirmation, $F(1, 257) = 3.24, \ p < .05, \ \eta^2_p = .01$. No difference was found for highly involved participants, $F(1, 257) = 0.01, \ p = .99, \ \eta^2_p < .001$. See Table 3.1 for the means.
Table 3.1 The effects of self-affirmation for different levels of value-involvement on fruit and vegetable consumption (four-week posttest).

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<thead>
<tr>
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<th>moderate involvement</th>
<th>strong involvement</th>
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<tr>
<td></td>
<td>no SA</td>
<td>SA</td>
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<tr>
<td>cooked vegetables</td>
<td>M = 5.07</td>
<td>M = 5.61</td>
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<tr>
<td>orange/grapefruit/</td>
<td>M = 1.09</td>
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<tr>
<td>lemon</td>
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<tr>
<td>apple/pear</td>
<td>M = 3.92</td>
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<td>other fruits</td>
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Fruit consumption (one-week posttest). Concerning fruit consumption, we expected to find a main effect of involvement only, and no interaction effect. For oranges/grapefruits/lemons we found this predicted main effect of involvement, $F(1, 289) = 5.28, \ p < .05, \ \eta^2_p = .02$. Strongly involved participants consumed more citrus fruits ($M = 1.53$) than moderately involved participants ($M = 1.05$). For apples/pears we also found a significant main effect of involvement, $F(1, 289) = 6.60, \ p < .05, \ \eta^2_p = .02$. Strongly involved participants indicated that they ate more apples and pears ($M = 4.50$) compared to moderately involved participants ($M = 3.75$). For bananas we found only a marginally significant main effect of involvement, $F(1, 289) = 2.91, \ p = .09, \ \eta^2_p = .01$. Strongly involved participants ate more bananas ($M = 2.51$) than did moderately involved participants ($M = 2.08$). We did not find a significant interaction between value-involvement and self-affirmation for any fruit category ($F < 2, \ n.s.$). Moreover, we found no significant effects at all for “other fruits” ($F < 2.5, \ n.s.$). Next, we looked at the effects of involvement and self-affirmation on all these fruit categories after four weeks.

13 When the transformed involvement measurement was used, the marginally significant main effect on banana consumption (one-week posttest) became somewhat less convincing, $F(1, 289) = 2.12, \ p = .15, \ \eta^2_p = .01$.  

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When the transformed involvement measurement was used, the marginally significant main effect on banana consumption (one-week posttest) became somewhat less convincing, $F(1, 289) = 2.12, \ p = .15, \ \eta^2_p = .01$.
Fruit consumption (four-week posttest). Again, we found a main effect of involvement on orange/grapefruit/lemon consumption \((F(1, 257) = 6.08, \ p < .05, \ \eta^2_p = .02)\), and apple/pear consumption \((F(1, 257) = 4.45, \ p < .05, \ \eta^2_p = .02)\). For bananas we found no significant effects \((F < 2, \ n.s.)\). We did find a significant main effect of involvement for “other fruits”, \((F(1, 257) = 8.40, \ p < .01, \ \eta^2_p = .03)\). See Table 3.1 for the means. Again, we did not find a significant interaction between value-involvement and self-affirmation for all fruit categories \((F < 1, \ n.s.)\).

Mediated Moderation: Predicting Cooked Vegetable Consumption (One-Week Posttest)

The aim of the current study was to test whether intentions predicted actual behavior, and thus could be regarded as real intentions. To determine whether intention to eat fruit and vegetables predicted cooked vegetable consumption, we tested whether the interaction between self-affirmation and involvement was mediated by immediate intention. We conclude that there is mediated moderation if the effect of the interaction on the dependent variable diminishes when we include the mediator in the model, while the mediator has a significant effect on the dependent variable (Baron & Kenny, 1986). As predicted, a linear regression showed a significant effect of the interaction between self-affirmation and involvement on intention, \(\beta = -.20, \ t(289) = -2.20, \ p < .05\). When we included both the interaction and intention in the model, the effect of the interaction on cooked vegetable consumption went from significant \((\beta = -.21, \ t(289) = -2.32, \ p < .05)\) to non-significant \((\beta = -.12, \ t(286) = -1.38, \ p = .17)\). In this complete model the unique effect of intention on cooked vegetable consumption was present, \(\beta = .41, \ t(286) = 4.79, \ p < .01\). The Sobel test showed that the effect of the interaction between self-affirmation and involvement on cooked vegetable consumption after one week was mediated by intention to eat healthy immediately after reading the threatening message, Sobel \(z = -2.00, \ p < .05\). These results indicate that intentions formed after a self-affirmation procedure predict actual cooked vegetable intake. We
conclude that the intentions are real. Does this effect remain present after four weeks?

Mediated Moderation: Predicting Cooked Vegetable Consumption (Four-Week Posttest)
For cooked vegetable consumption measured at the four-week posttest no significant interaction was found between involvement and self-affirmation. However, we did find the same pattern of results as for cooked vegetable consumption measured at the one-week posttest. The most interesting finding was the significant difference between no self-affirmation versus self-affirmation for moderately involved participants. To see whether intention predicted this specific effect, a linear regression analysis was performed, which showed a marginally significant effect of self-affirmation on intention for moderately involved participants (-1 SD below the mean), $\beta = .15, t(257) = 1.83, p = .07$. When we included both the interaction between moderate involvement and self-affirmation, and intention into the model, the significant effect of the interaction on cooked vegetable consumption went from significant ($\beta = .16, t(257) = 1.80, p = .07$) to non-significant ($\beta = .10, t(254) = 1.15, p = .25$). In this complete model the unique effect of intention on cooked vegetable consumption was present, $\beta = .41, t(254) = 4.09, p < .01$. The Sobel test showed, however, that the moderated mediation was not that convincing, Sobel $z = 1.65, p = .10$.

Although we did not find a convincing relationship between intentions measured at the immediate posttest and vegetable consumption measured at the four-week posttest, we did find a link between cooked vegetable consumption measured at the one-week posttest and the four-week posttest. The results showed that the effect of self-affirmation on cooked vegetables (four-week posttest) was mediated by cooked vegetable consumption measured at the one-week posttest (Sobel $z = 2.66, p < .01$).
Mediation: Predicting Citrus Fruit Consumption (One-Week and Four-Week Posttests)

For vegetable consumption we looked at moderated mediation effects. For fruit consumption we tested whether intention mediated the main effect of involvement on fruit consumption; this is, not a moderated mediation but simply a mediation effect. We conclude that there is mediation if the effect of the independent variable on the dependent variable diminishes when we include the mediator in the model, while the mediator has a significant effect on the dependent variable (Baron & Kenny, 1986). To see whether there was a mediation effect for orange/grapefruit/lemon consumption, a linear regression analysis was performed, which showed a significant effect of involvement on intention, $\beta = .18$, $t(291) = 3.19$, $p < .01$. When we included both involvement and intention in the model, the effect of involvement on citrus fruit consumption (one-week posttest) went from significant ($\beta = .12$, $t(291) = 2.11$, $p < .05$) to not significant ($\beta = .07$, $t(290) = 1.18$, $p = .24$). In this complete model the unique effect of intention on citrus fruit consumption was present, $\beta = .30$, $t(290) = 5.38$, $p < .01$. The findings of the Sobel test showed that the effect of involvement on citrus fruit consumption was mediated by intention to eat healthy, Sobel $z = 2.74$, $p < .01$. The mediation remained present for citrus consumption at the four-week posttest (Sobel $z = 2.26$, $p < .05$).

Mediation: Predicting Apple/Pear Consumption (One-Week and Four-Week Posttests)

To determine whether intention also mediated the effect on apple/pear consumption, a linear regression analysis was performed, which showed the significant effect of involvement on intention. When we included both involvement and intention in the model, the effect of involvement on apple/pear consumption (one-week posttest) went from significant ($\beta = .14$, $t(291) = 2.32$, $p < .05$) to not significant ($\beta = .06$, $t(290) = 1.17$, $p = .24$). In this complete model the unique effect of intention on apple/pear consumption was present, $\beta = .38$, $t(290) = 7.02$, $p < .01$. The Sobel test confirmed the mediation (Sobel $z = 2.90$, $p < .01$), and
the mediation remained present at the four-week posttest (Sobel $z = 3.00, p < .01$).14

Mediation: Predicting Other Fruit Consumption (Four-Week Posttest)

We also tested whether intention mediated the effect on other fruit consumption. A linear regression showed a significant effect of involvement on intention, $\beta = .21, t(259) = 3.43, p < .01$. When we included both involvement and intention in the model, the effect of involvement on other fruit consumption went from significant ($\beta = .17, t(259) = 2.80, p < .01$) to less strongly significant ($\beta = .13, t(258) = 2.05, p < .05$). In this complete model the unique effect of intention on other fruit consumption was present, $\beta = .22, t(258) = 3.64, p < .01$. The Sobel test confirmed the mediation, Sobel $z = 2.49, p < .05$.

Discussion

Self-Affirmation and Actual Health Behavior

The aim of the current study was to show whether or not a self-affirmation procedure can lead to intentions which are predictive of actual behavior. First, this is one of the few studies (for an overview, see Epton & Harris, 2008) in which it is found that self-affirmation has an effect on actual behavior. As predicted, self-affirmed participants who were moderately involved reported that they consumed significantly more portions of cooked vegetables than non-affirmed participants. This effect remained present after four weeks. For fruit consumption we found no effect of self-affirmation, but only the predicted effect of value-involvement. The more strongly participants felt about the importance of health, the more citrus fruits, apples, pears and other fruits they consumed. These outcomes were also present up to four weeks after the manipulations. Thus, the results show that self-affirmation can lead to actual behavior up to weeks after reading the

14 The effect of involvement on orange/grapefruit/lemon consumption and on apple/pear consumption measured at the four-week posttest was also mediated by, respectively, citrus consumption and apple/pear consumption measured at the one-week posttest (citrus fruit: Sobel $z = 2.37, p < .05$; apple/pear: Sobel $z = 2.52, p < .05$).
persuasive health message. But the effect is qualified by level of value-involvement and type of behavior.

In addition, we found that people's intention to increase fruit and vegetable intake was clearly predictive of both fruit and vegetable intake. People's intention predicted citrus fruit and apple/pear consumption after one week, and also after four weeks. For cooked vegetables the mediation effect was mainly present when vegetable consumption was measured after one week. However, for self-affirmed participants who were moderately involved, the increase in vegetable consumption after four weeks was predicted very well by behavior measured after one week. These results indicate that people's intentions measured directly after receiving a health message are predictive of actual behavior and that they are not false intentions aimed at short-term relief from the self-threat (Kok et al., 2007). The results also show that people can cognitively combine their intentions for fruit and vegetable intake in a general intention that is predictive of both types of behavior.

Sorts of Fruits Versus Sorts of Vegetables
There is a consensus among nutrition scientists that a high consumption of fruit and vegetables is related to health benefits (cf. Bogers et al., 2004). It reduces risks of cardiovascular diseases and many types of cancer. As a consequence, an important goal of health messages is to promote, with a single message, both fruit and vegetable consumption. However, the findings of the current study show that different processes determine fruit versus vegetable intake, and that different persuasive communications might be needed for both categories. This is in line with study findings that show that different psychosocial factors predict fruit and vegetable consumption (e.g., Brug, Lechner, & Vries, 1995; Trudeau et al., 1998). Trudeau et al. (1998) advised designing interventions that reach each category separately, and with most emphasis on vegetable intake. This recommendation closely matches our results, which show that especially vegetable intake is difficult to change owing to the defensive reactions people experience when confronted with a health threat.
Our research findings also show that different processes play a role for the different sorts of fruits and vegetables. We found no effect of the manipulations or of value-involvement on raw vegetable/salad consumption, or on banana consumption. It is possible that different kinds of barriers are essential in determining these behaviors. As Epton and Harris (2008) stated, each health behavior is possibly determined by different kinds of necessary adjustments. An explanation for the absence of an effect on raw vegetable/salad consumption may, for example, be found in the Dutch culture. The traditional Dutch meal is one with meat, boiled potatoes, and cooked vegetables. It is possible, therefore, that participants associate the intake of vegetables with cooked vegetables. Concerning bananas, there are some consistent myths – that they make you fat (Oakes, 2005), that they cause bowel obstructions, and that they do not contain many vitamins. This could cause participants not to consider bananas an effective way of averting the health risks mentioned in the threatening text. In sum, our research shows that to make health communications as effective as possible, we need information not only about the possible determinants of fruit versus vegetable consumption, but also about the different sorts of fruits and vegetables.

**Defensiveness and Self-Affirmation**

Self-affirmation Theory states “[…] self-affirming thoughts should make it easier to be objective about other self-threatening information […]” (Steele, 1988, p. 290). In other words, self-affirmation procedures lead to open-mindedness by eliminating defensiveness (e.g., Harris & Napper, 2005; Reed & Aspinwall, 1998; Sherman et al., 2000). In this theory, a rather black and white picture is presented: people are either closed-minded or open-minded towards a threatening message. The findings of the current study show that it might be somewhat more complicated. All participants read a text about the negative consequences of both insufficient fruit and insufficient vegetable intake. Both types of information are supposed to induce a self-threat. Our results suggest that participants only displayed defensive responses towards the part of the message about increasing vegetable intake (i.e.,
moderately involved participants consumed fewer vegetables when not affirmed). Concerning the part about fruit intake, no defensive responses were present (i.e., no effect of self-affirmation). These results indicate that people can be selectively defensive towards parts of a threatening text. Further research is needed to create a stable view on the exact processes underlying this.

**Involvement Concept**

The current findings also shed some light on the importance of value-involvement in persuasive health communications. Almost all previous research was concentrated on the detrimental effects of a strong level of involvement on persuasion (e.g., Ditto & Lopez, 1992; Harris & Napper, 2005; Kunda, 1987; Liberman & Chaicken, 1992). The current research findings provide a slightly more optimistic view on the way people process threatening information. If participants see health as a self-defining aspect, they are not inclined to react defensively – we found a general main effect of value-involvement for fruit and vegetable intake. These highly involved participants reported strong intentions to consume fruit and vegetables and, as our results at the four-week/one-week posttest show, correspondingly reported eating more fruit and vegetables. It seems that a more diverse view on values and the resulting self-threat is worthwhile. Self-affirmation Theory (Steele, 1988) discusses the presence or the absence of a self-threat. However, it is possible that it is essential to include levels of self-threats or possibly types of self-threats.

**Limitations**

Some limitations of the present study should be taken into account when interpreting the findings. We used self-reports to measure fruit and vegetable intake. It is possible that people overestimate their own fruit and vegetable intake. However, we did use a validated scale (Bogers et al., 2004), and we included two follow-up measurements instead of using just one measurement. The follow-up measurements show a consistent pattern, making the results more reliable. However, only a replication using objective fruit and vegetable intake
measurements can eliminate all concerns about potential biases. Future research should also focus on the effects of self-affirmation on a range of other health behaviors, including health-promoting and health-compromising behaviors.

Summary and Conclusion
To our knowledge, the current study provides evidence for the first time that self-affirmation can engender true intentions; intentions that are predictive of actual health behavior. We found that this effect remained present not only after a week (like Epton & Harris, 2008), but also after a whole month. By including variations in value-involvement and by including different health-related behaviors, we provided a more differentiated picture of the way people handle self-threats. Not all involved people have to process health information in a defensive way, and people can be defensive towards only parts of a message. The current findings suggest that future research on persuasion might profit from specification of the conditions and the underlying cognitions that lead to defensive information processing and impair actual behavior change.