# Temporal framing in persuasive health messages

Applying the two-factor approach of Consideration of Future Consequences



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### Abstract

To tackle the ever-growing obesity rate, people should be encouraged to maintain a healthy diet. Fruit and vegetables are deemed important parts of such diets, but most people do not consume sufficient amounts. This might be remedied through persuasive health messages informing people about short- and long-term consequences of unhealthy diets. The main goal of this study is to examine such messages' effectiveness by considering the interplay between their temporal framing and individual's differences in their Consideration of Future Consequences (CFC). To measure CFC the questionnaire CFC-14 has been used, which, contrasting the former CFC-12, considers two dimensions: CFC-future and CFC-immediate. Following previous research, this study expected that, for those oriented towards the future (high CFC-future), reading long-term framed messages would increase their intention to eat sufficient amounts of fruit and vegetables. As for people focussed on the present (high CFCimmediate), they were expected to be more convinced by short-term framed messages. This presumed effect was hypothesized to be mediated by attitude and perceived behavioural control. These hypotheses were tested with an online experiment in which 130 participants read short- or long-term framed messages and indicated their intention to eat sufficient amounts of fruit and vegetables. The results did not confirm the hypotheses. Possible explanations would be discrepancies between the dimensions measured by the CFC-14 and the CFC-12 questionnaire, or the lack of severity of health consequences described in the persuasive health messages that was used.

### Temporal framing in persuasive health messages

### Applying the two-factor approach of Consideration of Future Consequences

Half of the Dutch population suffers from medium or extreme overweight. This number increases every year; in 1990 this was only 35.1% (CBS, 2018), while in 2019 this has increased to 50.1% (CBS, 2019). One suffers from being overweight when one's BMI is above 25. When one's BMI levels increase above 30, one is classified as obese (CBS, 2018). Such high BMI increases have been linked to coronary artery disease, high risk of getting a stroke, hypertension (Wyatt, Winters, & Dubbert, 2006) and type 2 diabetes (Kopelman, 2007). Furthermore, overweight carries a social stigma that may contribute to depression, anxiety, and lowered self-esteem (McElroy et al., 2004). Discrimination in employment, education, and healthcare are similarly prevalent for people with overweight (Wyatt et al., 2006). Besides individual health risks, there are also societal consequences. The physical and psychological health issues associated with being overweight come with greater use and cost of health care services (Wyatt et al., 2006). However, the biggest societal cost comes in the form of the extra years obese people spend at home as a result of their poor health, thus keeping them from work (Crawford, Jeffery, Ball, & Brug, 2011). Estimations are that in the next 30 years. The Netherlands will have to spend 11% of the total health care budget -5million euros each year - to help people suffering from being overweight (OECD, 2019).

As obesity has been linked to medical, psychosocial, and economic consequences, it can be seen as a huge problem. To tackle this problem, one must first understand how it develops. Many factors contribute to the development of obesity: genetic, environmental, social, physiologic, as well as economic (Kopelman, 2007). However, obesity is most commonly caused by too much calorie intake relative to calorie burning (Wright & Aronne, 2012). Thus, to tackle the obesity rate, people should either reduce their calorie intake by changing their diet or increase the calories that are being burned by increasing physical activity. Low-calorie diets – usually 800 to 1500 calories a day – have been recommended for weight loss, as these result in a mean weight loss of 8% when followed for at least six months (Kopelman, 2007).

Key to these diets is a sufficient intake of fruit and vegetables as these have low energy density but are high in nutrients and fiber (Sartorelli, Franco, & Cardoso, 2008). Consuming fruit and vegetables not only helps losing weight, but also reduces high blood pressure (Sacks et al., 2001), and relieves constipation (Dreher, 2018). Maintaining a healthy diet can thus be the solution to the obesity problem. Unfortunately, not many people eat the recommended amount of fruit and vegetables. People should eat 450 grams of fruit and vegetables daily (Voedingscentrum, 2019). However Dutch citizens consume only 253 grams daily (RIVM, 2016). Thus people should be encouraged to eat more fruit and vegetables, which can be done by using persuasive health messages. Narrative communication, thus messages, are seen as more personal, realistic, believable, and memorable than visual forms of communication (Hinyard & Kreuter, 2007) and are thus a helpful tool. The current study will investigate the relationship between short- versus long-term framed persuasive health messages and individual differences in considering future health consequences. To maximize the effect of the messages on intention to eat sufficient amounts of fruit and vegetables, it is important to understand the interplay between the framing of messages and individual characteristics.

## Persuasive health messages

There are different approaches to communicate healthy food choices, including educational programs, nudges, and food-labels. One of the most used forms of communication is campaigning. When designing campaigns one should consider what type of message is conveyed and how it is framed since this influences the effectiveness of the message. Persuasive health messages inform people about health risks, for example constipation, and try to encourage people to take action and protect themselves from these risks, for example by maintaining a healthy diet (Kees, 2010). These risks can be framed in different ways (Hsee & Rottenstreich, 2004), for example, losses versus gains (Schneider et al., 2001), or risky groups versus risky behaviour (Spears, Abraham, Abrams, & Sheeran, 1992). Since there are many ways of framing messages, it is important to identify the most effective framing.

A type of framing that has been proved to be effective is valence framing (Chang & Lee, 2009). An example is *maintaining a healthy diet will reduce blood pressure* versus *without a healthy diet your blood pressure increases*. Whether positive or negative framing is most effective depends on the type of framing of the message. Levin, Schneider, and Gaeth (1998) differentiate between attribute framing and goal framing. In attribute framing, the frame is an attribute of the decision: *following a healthy diet is successful 80% of the time*. In goal framing, the relationship between behaviour and goal attainment is framed: *if you follow a healthy diet, you will relieve constipation*. When using attribute framing, positive framing works better than negative, and when using goal framing, negative framing works better than positive framing (Krishnamurthy, Carter, & Blair, 2001)

The messages of the current study will not differ in valence framing, but solely in

temporal framing, messages will focus on short- or long-term risks (Orbell, Perugini, & Rakow, 2004; Kees, 2010). This can be achieved by stating that the health consequence will happen "in the next few days" in the short-term condition, and "in the next few years" in the long-term condition (Chandran & Menon, 2004). The Construal Level Theory (CLT; Trope & Liberman, 2003) offers an explanation as to why temporal framing influences the interpretation of messages. The CLT proposed that people form abstract mental construals of distant events. The psychological distance is the experience of how far away something is from the here and now. There are four types of psychological distance: temporal, spatial, social, and hypothetical distance (Trope & Liberman, 2010). The temporal distance explains why temporal framing influences the interpretation of messages (Kees, 2010). The perception of temporal distance alters the way future events are construed, and thus influences the interpretation and choices related to these future events. When an event is distant in time it is seen in abstract terms, however, when an event is proximal it is conceptualized in concreter terms (Trope & Liberman, 2003). People may fail to adhere to a healthy diet since the risks of overweight are perceived as occurring in the future, and thus not concrete enough to motivate people to take action. If these risks are framed as proximal, and thus concrete, people should take consequences seriously and try to maintain a healthy diet (Kees, 2010). Unfortunately, messages stating someone can lose weight within days, do not come across as realistic. However, certain consequences of overweight do come across as realistic when framed shortterm, for example constipation. These can be used when applying temporal framing to tackle the obesity problem by increasing peoples' intention to maintain a healthy diet.

Nonetheless, when empirically testing the effects of temporal framing, mixed results have been found. Chang and Lee (2009) manipulated the temporal framing of charitable messages by stating that "1250 children die each hour" versus "11 million children die each year". Their results showed that solely temporal framing does not influence the effectiveness of messages. However, temporal framing was moderated by valence framing; long-term negatively framed messages are more persuasive than short-term negative framed messages. Vice versa for positively framed messages. Chandran and Menon (2004) found the opposite effect when studying messages conveying various health hazards, for example "every day / year a significant number of people suffer the consequences of eating unhealthy foods". Their results showed that short-term negatively framed messages. To conclude, it is unclear whether there is an effect of temporal framing on intention. Therefore no direct effect of temporal framing on the intention to eat sufficient amounts of fruit and vegetables is expected in the current study. However, the

effectiveness of temporal framing may depend on other factors, for example individual differences.

### **Individual differences**

The right match between the persuasive delivery style of messages and the individual characteristic can strengthen the effectiveness of messages. For example, individual differences in the need for cognition (Cacioppo & Petty, 1982) or susceptibility (Orji, Mandryk, & Vassileva, 2015) strengthen the effectiveness if the message matches the characteristic. Another example of such a characteristic is the Consideration of Future Consequences (CFC). CFC is defined as "the extent to which individuals consider the potential distant outcomes of their current behaviours and the extent to which they are influenced by these potential outcomes". It is measured as a continuum: someone with a high CFC-score considers future consequences more when choosing how to behave, someone with a low CFC-score considers future consequences less (Strathman et al., 1994). CFC is a potential factor which can tackle the obesity problem since it influences whether people follow healthy diets. The benefits of eating healthy are felt after a longer period whereas eating unhealthy has immediate gratification (Joireman, Shaffer, Balliet, & Strathman, 2012). Thus a way to increase an individuals' intention to eat healthier is adjusting messages to individuals' CFC-level. People high in CFC will be more convinced by messages conveying long-term consequences, as opposed to people low in CFC who will be more convinced by messages conveying short-term consequences. This can be used in situations where peoples' CFC-level is known, for example, self-help websites, dietician, or medical settings.

Orbell and colleagues (2004) adjusted to individuals' CFC-level by modifying the temporal framing of their messages. Their participants read a message about negative consequences of cancer screening, either framed long- or short-term: "*Some people find that taking part in screening means that they worry and have to undergo unpleasant procedures for years into the future* versus *immediately*". With the CFC-12 questionnaire (Strathman et al, 1994) they measured participants' CFC. Their results showed that participants low in CFC who read negative long-term message had higher intention to participate in cancer screening than participants low in CFC who read a negative short-term message. Participants high in CFC who read a negative short-term message. Thus if participants are more focussed on the present, and read a message stating that participating in cancer screening means they have to undergo unpleasant procedures years later on, they have

higher intention to participate than if they read that cancer screening comes with immediate unpleasant procedure. In order to understand the hypotheses later explained one should keep in mind that Orbell and colleagues (2004) used consequences of the intervention itself.

In addition, Orbell and colleagues (2004) showed that the effect of CFC on intention is mediated by aspects of the theory of planned behaviour (TPB; Ajzen, 1985). According to the TPB, the best predictor of deliberate behaviour is intention. Intention is determined by attitude towards the specific behaviour, subjective norms, and perceived behavioural control (PBC) (Aronson, Wilson, & Akert, 2013). To maximize the effectiveness of messages, one should understand how messages influence intention. Orbell and colleagues (2004) showed that the effect of CFC on intention was mediated by attitude and PBC. Thus when participants were exposed to the message, they had a positive attitude towards saw cancer screening and were confident that they could take part in screenings. The effect of framing was not mediated by the subjective norm, which is explicable. The subjective norm is the judgement of significant others towards that particular behaviour. Framing messages differently should not alter the perception of others' beliefs. It is therefore unnecessary to look into the effects of framing on subjective norms any further. However, attitude, PBC, and intention are interesting to take into account, since they predict 52% of the variance of decisions to eat healthy (Åstrom & Rise, 2001). To summarize, the research by Orbell and colleagues (2004) showed that temporal framed messages affect people differently, due to individual differences on the CFCcontinuum.

However, Joireman and colleagues (2012) proposed that CFC should not be measured as a continuum but as a two-factor distinction: CFC-future and CFC-immediate. Concern with future consequences and concern with immediate consequences are not opposites and can happen at the same time within one individual. However, one can still develop a dominant temporal orientation. This view on CFC has strong implications. By merging CFC-immediate and CFC-future into one CFC-score important conclusions could be overlooked, since it is unclear whether CFC-future or CFC-immediate predict the behaviour. For instance, eating fruit and vegetables could not be driven by concerns with future consequences (long-term health benefits), but rather by concerns with immediate consequences (inconvenience). The differing interpretations would have different implications, and different interventions would be developed. For example, if CFC-immediate is the best predictor of maintaining a healthy diet, interventions should focus on reducing concerns with immediate consequences. However, if CFC-future is the best predictor, interventions should raise awareness of future consequences. It is therefore important to make a distinction between CFC-future and CFC- immediate. To measure the two-factor distinction, Joireman and colleagues (2012) developed a new questionnaire, the CFC-14. They hypothesized that CFC-future would positively correlate with exercise, healthy eating attitudes, and intentions. On the other hand, CFCimmediate would correlate negatively with these variables. With a questionnaire study, they confirmed this. The CFC-future and CFC-immediate subscale also showed to be reliable (respective Cronbach's  $\alpha = .80$  and  $\alpha = .84$ ) and correlated negatively with each other.

### The current study

In order to tackle the obesity problem, people should be encouraged to eat sufficient amounts of fruit and vegetables. Persuasive health messaging is a tool which can help achieving this. To examine the effectiveness of these messages, the goal of the current study is looking into the interplay between temporal framing of messages and individuals' differences in CFC based on the two-factor distinction. The first research question is *do CFC-future and CFC-immediate moderate the effect of the temporal framed message on intention to eat sufficient amounts of fruit and vegetables*? The first two hypotheses are based on the research by Joireman and colleagues (2012) and Orbell and colleagues (2004). As earlier mentioned, messages used by Orbell and colleagues (2004) concern negative consequences of *not* participating in the intervention. Hence the expected results of the current study are the opposite of Orbell and colleagues' (2004) results. In addition no effect of temporal framing on intention is expected when CFC-future and CFC-immediate are low, since low CFC-future and -immediate participants are expected to be equally sensitive to short- and long-term messages. The hypotheses are:

- CFC-future moderates the effect of temporal framing on intention. If someone with high CFC-future reads a long-term framed message, they will have stronger intention to eat sufficient amounts of fruit and vegetables, than if they read a short-term framed message. If someone scores low on CFC-future, there will be no effect of long- and short-term framed messages on intention to eat fruit and vegetables.
- 2. CFC-immediate moderates the effect of temporal framing on intention. If someone with high CFC-immediate reads a short-term framed message, they will have stronger intention to eat sufficient amounts of fruit and vegetables, than if they read a long-term framed message. If someone scores low on CFC-immediate, there will be no effect of long- and short-term framed messages on intention to eat fruit and vegetables.

The second research question is *do attitude and perceived behavioural control influence the intention to eat sufficient amounts of fruit and vegetables?* Orbell and colleagues (2004) showed that the effect of CFC on intention is mediated by aspects of the Theory of Planned Behaviour (attitude and perceived behavioural control). This effect is also expected in the current study. Therefore the third and fourth hypotheses are the following:

- 3. The combined effects of temporal framing, CFC-future and CFC-immediate on intention are mediated by attitude.
- 4. The combined effects of temporal framing, CFC-future and CFC-immediate on intention are mediated by perceived behavioural control.

See figure 1 for the model visualizing the four hypotheses. Answering the research questions will contribute to developing effective messages which can encourage people to eat sufficient amounts of fruit and vegetables. This contributes to tackling the obesity problem. In addition, more knowledge will be gained concerning the two-factor distinction of CFC and its correlation with the aspects of the Theory of Planned Behaviour.

To answer the research questions participants will be asked to read a short- or a longterm message and answer questionnaires concerning the aspects of the theory of planned behaviour and CFC.

# Figure 1

Complete model of expected relationships



### Method

**Participants.** A power analysis done with G\*Power 3.1 showed that for a 2 (temporal framing: short-term vs. long-term) x 2 (CFC-future: high vs. low) x 2 (CFC-immediate: high vs. low) ANOVA, when searching for a medium effect (f = .25) with a power of .80, 128 participants are needed. The mediators attitude and perceived behavioural control (PBC) were not taken into the power analysis, as these serve explorative functions.

The actual sample consisted of 186 participants of which 70.7% indicated that they do not eat enough fruit and vegetables daily. Only these participants (n = 130) were included in further analyses since they are the target group of the message. By doing so participants who only answered demographic questions were excluded, as demographic questions were asked before asking whether participants eat sufficient amounts of fruit and vegetables. After excluding these participants a Missing Values Analysis was conducted, which showed that seven participants did not finish the questionnaire, and indicated that Little's (1988) test of Missing Completely at Random (MCAR) was not significant,  $\chi 2 = 1.43$ , DF = 3, p = .698. Therefore, missing data was considered random. As such, per statistical analysis, listwise deletion was used since it is known to produce unbiased estimates and conservative results. The sample that was analysed consisted of 38 men, 91 women, and one participant who identifies themselves as 'other' (18 – 75 years, M = 28.56, SD = 12.72). The most common currently enrolled or completed form of education was a master's degree following a bachelor's degree. 78.5% of the sample is from The Netherlands. The participants were recruited with snowballing in the direct environment of the researcher between 19-03-2020 and 27-03-2020. After collecting the data another power analysis has been conducted. In order to make the data analysis more clear and structured, there has been chosen to test all four hypotheses with regression, instead of testing the first and second hypotheses with ANOVA and the third and fourth hypotheses with regression. Therefore the post-hoc power analysis has also been conducted for a regression. This showed that with 130 participants the actual power of the current study is .95. This is satisfactory since a power of .80 gives enough certainty to state that the found effects exist (Field, 2009).

**Design and procedure.** This study used a between-subjects design and was cross-sectional. The research was done online via the program Qualtrics and administered in English. Before being allowed to take part in the research, participants had to agree with the informed consent. Firstly, participants answered questions concerning demographic variables (gender, age, education, and ethnicity) and indicated whether they eat sufficient amounts of fruit and vegetables daily by answering the question: "According to the nutrition centre you need at least 2 pieces of fruit and 250 grams of vegetables each day. More than 80% of the Dutch population does not reach this amount. Do you eat enough fruit and vegetables each day?" The participants were randomly assigned to the long- or short-term condition. All participants read one persuasive health message stating that eating too little fruit and vegetables would lead to constipation. Depending on the condition, the time-frame of getting constipation was either framed short-term (within days) or long-term (within years). After reading the message participants filled in questionnaires concerning attitude, PBC, and intention regarding eating sufficient amounts of fruit and vegetables. Lastly, they filled in the CFC-14. Taking part in the study took approximately ten minutes.

**Pre-test of message.** To develop short- and long-term messages that are equally negatively framed a pre-test was done. By ensuring that there is no difference in negativity in the messages, the effect of negativity can be ruled out when interpreting the result. The messages used should only differ in temporal framing. Chandran and Menon (2004) showed that perception of temporal frames can be achieved by using the word '*day*' versus '*year*'. This was applied when developing the messages. The messages used in this study are goal framed. When using goal framed messages, negatively framed messages have a bigger effect than positively framed messages (Krishnamurthy et al., 2001), thus only negatively framed messages were used in the current study. The sample of the pre-test consisted of twenty participants, from which seven men and thirteen women (19 – 55 years, M = 25.95, SD = 10.07). The most common currently enrolled or completed form of education was a master's degree. 100% of the sample is Dutch. Only 30% indicated that they eat enough fruit and vegetables daily.

The participants rated seven different messages on a scale of 0 = not at all negative to 100 = very negative. These messages were all the same: "Eating sufficient amounts of fruit and vegetables is very important. When you don't eat enough fruit and vegetables you'll miss important nutrients and fibres which will have consequences for your health. You'll have, for example, a higher chance of getting .... It is therefore important to eat enough fruit and vegetables". The seven different combinations of health consequences and time-frame were offered to the participants on the dotted line. These consequences were flu, constipation, gaining weight, and diabetes. The consequence were offered to the participants in this particular order, the least unpleasant consequence was offered first and the most unpleasant consequence was offered last. In this way, the most unpleasant consequence did not make the least unpleasant consequence seem bearable. There was chosen for these different consequences since they are all realistic consequences of eating too little fruit and vegetables. *Diabetes* and *gaining weight* were not described in the short-term condition since it does not seem realistic to suffer from these within a few days. Three messages were framed in short-term consequences, and four messages were framed in long-term consequences. To test whether the temporal framing of the messages clearly came across, participants indicated whether they thought the message was framed short- or long-term.

The data was analysed with a one-way ANOVA. Prior to interpreting the results several assumptions for conducting an ANOVA were evaluated. Inspection of skewness and Shapiro-Wilk statistics indicated that the assumption of normality was supported. Levene's statistic was not significant, F(1, 5) = 3.10, p = .139, and thus the assumption of homogeneity of variance was not violated. The ANOVA was not statistically significant, indicating that there was no difference in perception of the negativity of the messages, F(1, 5) = 5.60, p = .064. The results also showed that not all temporal framing of the messages was clear to the participants. See table 1 for an overview of the results. Based on these results *constipation* was chosen for the short- and long-term framed message, as it is the only consequence where the temporal framing is 100% clear in both the short- and long-term condition. Even though there was no significant difference in the perception of negativity, there was still chosen for the same consequence in the short- and long-term condition, so the only difference between the conditions was the temporal framing of the message (using the word *day* versus. *year*). See appendix A for the final used messages.

# Table 1

Message	Seen as ST or LT?	Mean	Minimum	Maximum	SD
Flu within days	95% ST 5% LT	50.80	20.00	83.00	20.79
Constipation within days	100% ST	52.25	16.00	95.00	19.68
Flu within years	100% LT	59.20	9.00	88.00	21.26
Weight within weeks	70% ST 30% LT	55.40	0.00	100.00	23.71
Constipation within years	100% LT	62.45	23.00	100.00	19.28
Diabetes within years	100% LT	79.35	11.00	100.00	21.17
Weight within years	100% LT	62.45	5.00	100.00	26.27

Temporal framing interpretation and negativity scores of messages.

*Note*. ST = short-term, LT = long-term, SD = standard deviation.

**Questionnaires.** *Theory of planned behaviour aspects.* To measure attitude, PBC, and intention eight questions proposed by Orbell and colleagues (2014) were used. These items were centered around bowel cancer screening. To use them in the current study, they were rewritten to be centered around eating fruit and vegetables (see appendix B for questionnaires). The eight items had to be answered on a six-point Likert scale with different starting points for each item. Attitude was accessed by the item: *'Eating more fruit and vegetables would be ...''* answered on a scale from *worthwhile–worthless, necessary–unnecessary, good–bad, important– unimportant, pleasant–unpleasant, beneficial–harmful, desirable– undesirable, and nice–nasty with high internal reliability of \alpha = .84 found in the current study. PBC was measured on a scale from 1 = not at all confident to 6 = very confident) with satisfactory internal reliability of \alpha = .80 found in the current study. Intention was accessed with three items (e.g. <i>''I intend to eat more fruit and vegetables''* answered on a scale from  $1 = strongly disagree}$  to 6 = strongly agree) with high internal reliability of  $\alpha = .84$  found in the current study.

*CFC-future and CFC-immediate.* The CFC-14 scale (Joireman et al., 2012) is revised from the CFC-12 scale (Strathman et al., 1994). It consists of 14 items to be answered on a seven-point Likert scale with 1 = very uncharacteristic of me till 7 = very characteristic of me. The CFC-14 scale has two subscales: CFC-future (e.g. "Often I engage in a particular behaviour in order to achieve outcomes that may not result for many years") and CFCimmediate (e.g. "I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date"). These subscales are continuous variables. The CFC-future and CFC-immediate subscales have high internal reliability (respective Cronbach's as found in Joireman et al., 2012:  $\alpha = .80$  and  $\alpha = .84$ ), a good test-retest reliability, and a good convergent and discriminant validity (Joireman et al., 2004). In the current study the CFC-future and CFC-immediate subscales also have high reliability (respectively  $\alpha = .80$  and  $\alpha = .83$ ).

**Statistical analyses.** The data was analysed with the Statistical Program for Social Sciences (SPSS) with the extensions PROCESS v3.0 (Hayes, 2017) which conducts regressions. The first and second hypotheses were tested with model 1 for moderation. The dependent variable was the intention to eat fruit and vegetables, the independent variable was temporal framing, and the moderators were CFC-future and CFC-immediate. In addition, the first and second hypotheses were tested with a factorial between-groups ANOVA, in order to see if this shows

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different results. For this analysis only, the continuous variables CFC-future and CFCimmediate were recoded into dichotomy variables. In the other analyses the CFC-future and CFC-immediate variables stayed continues. The third and fourth hypotheses were tested with model 9. The dependent variable was intention, the independent variable was temporal framing, the moderators were CFC-future and CFC-immediate, and the mediators were attitude and PBC. Before conducting the regression and ANOVA the assumptions of normality, outliers, linearity, and homoscedasticity of residuals were evaluated.

### Results

Descriptive statistics. Seventy participant were in the short-term condition, and sixty participants were in the long-term condition. The results showed no sex differences in CFCfuture, t(122) = -0.17, p = .864, CFC-immediate, t(122) = 0.01, p = .993, attitude, t(122) = -1,15, p = .251, perceived behavioural control, t(122) = -0.47, p = .640, and intention, t(122)= -1.23, p = .223. There were also no age differences found in CFC-future r(125) = .07, p = .07.427, CFC-immediate, r(125) = -.05, p = .608, attitude, r(125) = -.03, p = .760, perceived behavioural control, r(125) = -.04, p = .695, and intention r(125) = .04, p = .646. There was a high correlation between attitude and intention, r(125) = .51, p < .001, a high correlation between perceived behavioural control and intention, r(125) = .65, p < .001, and a moderate correlation between attitude and perceived behavioural control, r(125) = .46, p < .001. There was a high negative correlation between CFC-future and CFC-immediate, r(125) = -.57, p <.001, meaning that if participants scored high on CFC-future they were likely to score low on CFC-immediate. In addition, CFC-future correlated weakly with intention, r(125) = .26, p = .003. CFC-immediate had a small negative correlation with perceived behavioural control, r(125), -.18, p = .047, and a small negative correlation with intention, r(125) = -.19, p = .033. The average scores of the variables and the correlations are shown in table 2. The CFC-scores shown in this table are based on questions to be answered on a scale ranging from one to seven. The attitude, perceived behavioural control and intention questions were to be answered on a scale ranging from one to six.

### Table 2

	М	SD	(1)	(2)	(3)	(4)	(5)
(1) CFC-future	4.65	0.86	1.00				
(2) CFC-immediate	3.72	1.01	57**	1.00			
(3) Attitude	4.84	4.84	.18*	17	1.00		
(4) Perceived behavioural control	4.54	4.54	.12	18*	.46**	1.00	
(5) Intention	4.18	4.18	.26**	19*	.51**	.65**	1.00

Mean (M), Standard Deviation (SD), and correlation

\*p < .05

*Note*. CFC = consideration of future consequences.

Assumption checks. Prior to interpreting the results several assumptions for conducting a regression were evaluated. First, stem-and-leaf plots and boxplots indicated that the variables were normally distributed and free from univariate outliers. Second, inspection of the normal probability plot, as well as the scatterplot of standardised residuals against standardised predicted values, indicated that the assumption of normality, linearity, and homoscedasticity of residuals were met. However, Mahalanobis Distance did exceed the critical  $x^2$  for df = 2 (at  $\alpha = .05$ ) of 5.99, indicating that multivariate outliers were of concern. Further analyses showed that cases that exceeded the Mahalanobis Distance of 5.99 did not have a Cook's Distance higher than 1. Therefore, cases of which the Mahalanobis Distance was too high were still taken into further analyses.

In order to test the first and second hypotheses with an ANOVA, the assumptions for conducting an ANOVA were also checked. A Shapiro-Wilk test showed a significant departure from normality, W(128) = .97, p = .007, but this is not seen as a problem since the sample is quite large. Levene's test was not significant for the CFC-future distribution, F(3, 121) = .29, p = .836, nor the CFC-immediate distribution, F(3, 121) = .43, p = .730, thus the assumption of homogeneity of variance was met.

## H1: CFC-future moderates the effect of temporal framing on intention

By using model 1 of the extension PROCESS v3.0 (Hayes, 2017) the moderation of the continuous variable CFC-future was tested. The dependent variable was intention, the independent variable was temporal framing and the moderator was CFC-future. The regression analysis showed that the overall model was significant, F(3, 121) = 3.57, p = .016,  $R^2 = .08$ . Thus 0.8% of the variance in intention was due to temporal framing, CFC-future, and the interaction between temporal framing and CFC-future. Temporal framing on its own was not a significant predictor of intention, b = -.52, t(121) = -.57, p = .571. In addition, CFC-future on its own was not a significant predictor of intention, b = .08, t(121) = .27, p = .788. Lastly, the interaction between temporal framing and CFC-future on its own was also not a significant predictor of intention, b = .15, t(121) = .77, p = .445.

The first hypothesis was also tested with a factorial between-groups ANOVA. In order to do so, the continuous CFC-future variable was transformed into a dichotomous variable by assigning the lowest thru 3.5 scores to the 'low CFC-future' category and the 3,51 thru highest scores to the 'high CFC-future' category. The ANOVA showed no main effect of temporal framing, F(1, 121) = 0.84, p = .360, nor a main effect of CFC-future, F(1, 121) = 6.67, p = .011. Most importantly, the ANOVA showed no significant interaction effect of

CFC-future and temporal framing on intention, F(1, 121) = 2.44, p = .068. Since the interaction between temporal framing and CFC-future did not explain variance in intention, there was no moderation thus the first hypothesis was rejected. See figure 2 for a visualization of the non-significant interaction effect.

# Figure 2





### H2: CFC-immediate moderates the effect of temporal framing on intention

By using model 1 of the extension PROCESS v3.0 (Hayes, 2017) the moderation of the continuous variable CFC-immediate was tested. The dependent variable was intention, the independent variable was temporal framing and the moderator was CFC-immediate. The regression analysis showed that the overall model was not significant, F(3, 121) = 2.41, p = .070, thus variance in intention was not explained by temporal framing, CFC-immediate, and the interaction between temporal framing and CFC-immediate. Temporal framing on its own was not a significant predictor of intention, b = .97, t(121) = 1.49, p = .138. In addition, CFC-immediate on its own was not a significant predictor of intention, b = .13, t(121) = .50, p = .618. Lastly, the interaction between temporal framing and CFC-immediate on its own was also not a significant predictor of intention, b = .13, t(121) = -1.29, p = .200. See figure 3 for a visualization of the non-significant interaction effect. This figure shows that the non-significant differences were leaning towards the hypothesised direction. High CFC-immediate participants who read a short-term framed message, had stronger intention to eat sufficient

amounts of fruit and vegetables than high CFC-immediate participants who read a long-term framed message. However, this difference was not significant. Figure 3 also shows a non-significant unexpected difference in intention of low CFC-immediate participants. When low CFC-immediate participants read a long-term framed message their intention was higher than when low CFC-immediate participants read a short-term framed message. However, this difference was not significant and only leaning towards this unexpected direction.

The second hypothesis was also tested with a factorial between-group ANOVA. In order to do so, the continuous CFC-immediate variable was transformed into a dichotomous variable by assigning the lowest thru 3.5 scores to the 'low CFC-immediate' category and the 3,51 thru highest scores to the 'high CFC-immediate' category. The ANOVA showed no main effect of temporal framing, F(1, 121) = 0.63, p = .428, nor a main effect of CFC-immediate, F(1, 121) = 1.28, p = .258. Most importantly, the ANOVA did not show a significant interaction effect of CFC-immediate and temporal framing on intention, F(3, 121) = .64, p = .590. Since the interaction between temporal framing and CFC-immediate did not explain variance in intention, there was no moderation thus the second hypothesis was rejected.

### Figure 3





H3 & H4: the combined effects of temporal framing, CFC-future and CFC-immediate on intention are mediated by attitude and perceived behavioural control. The third and fourth hypotheses were tested simultaneously by using model 9 of the PROCESS v3.0 extension (Hayes, 2017). See figure 4 for a visualized overview of the relationships as tested by model 9. This model tested the combination of the moderating effect of the continuous variables CFC-future and CFC-immediate, plus the mediating effect of attitude and perceived behavioural control on intention. The results reflect the results found when testing the first and second hypotheses. CFC-immediate did not moderate the relationship between temporal framing and attitude, b = .14, se = .15, p = .356, nor the relationship between temporal framing and perceived behavioural control, b = -.34, se = .18, p = .064. In addition, CFC-future did not moderate the relationship between temporal framing and attitude, b = .24, se = .17, p = .175, nor the relationship between temporal framing and attitude, b = .24, se = .22, se = .21, p = .305.

Adding to these results, the mediating effects of attitude and perceived behavioural control were also tested. The results showed no significant relationship between temporal framing and intention, b = .21, se = .12, p = .089. There was also no significant relationship between temporal framing and attitude, b = -1.68, se = 1.21, p = .170, nor temporal framing and perceived behavioural control, b = 2.26, se = 1.51, p = .136. Thus there was no mediating effect of attitude or perceived behavioural control, therefore the third and fourth hypotheses were rejected. However, the relationship between attitude and intention was significant, b = .39, se = .10, p < .001, and so was the relationship between perceived behavioural control and intention, b = .59, se = .08, p < .001.

Next to the hypothesised effects, model 9 of PROCESS v3.0 (Hayes, 2017) also tested other effects. CFC-future did not have a direct effect on attitude, b = -.25, se = .27, p = .354, neither did CFC-immediate, b = -.27, se = .23, p = .241. CFC-future also did not have a direct effect on perceived behavioural control, b = .36, se = .34, p = .286, neither did CFC-immediate, b = .37, se = .29, p = -.709.

# Figure 4

Path analysis model of associations between temporal framing, CFC-future, CFC-immediate, attitude, perceived behavioural control, and intention.



*Note.* Coefficients presented are standardized linear regression coefficients. \*\*\*p < .001

### Discussion

The current study aimed to develop effective persuasive health messages to increase peoples' intention to eat sufficient amounts of fruit and vegetables. It was expected that these messages were more effective if there is a right match between the time frame of the message and peoples' CFC-future or CFC-immediate orientation. To delve deeper into this relationship, the current study also tested whether attitude and perceived behavioural control (PBC) towards eating sufficient amounts of fruit and vegetables mediated the effect of temporal framing on intention.

None of the hypotheses stated were confirmed. CFC-future did not moderate the effect of temporal framing on intention; there was no effect of short- and long-term framed messages for high CFC-future participants, nor for low CFC-future participants. CFCimmediate also did not moderate the effect of temporal framing on intention; there was no difference in the effect of short- and long-term framed messages for high CFC-immediate participants, nor for low CFC-immediate participants. The third and fourth hypotheses were also rejected; neither attitude nor PBC mediated the effect of temporal framing on intention.

The hypotheses were mostly based on the research by Orbell and colleagues (2004), who *did* find a moderating effect of CFC on the relationship between temporal framing and intention, as well as a mediating effect of attitude and PBC. The message the researchers used concerned the negative consequences of the intervention cancer screening, whereas the current study used messages concerning the negative consequences of not following the intervention eating sufficient amounts of fruit and vegetables, therefore the results were expected to be opposite of each other. Orbell and colleagues' (2004) study showed that low CFC participants who read a negative long-term message had higher intention to participate in cancer screening. However, the current study did not show any moderating effect of CFC-future, nor CFC-immediate. That raises the question: why did Orbell and colleagues (2004) find an effect, but the current study did not? There are two important differences between this study and Orbell and colleagues' (2004) study, both of which offer an explanation to the differences in results.

Firstly, Orbell and colleagues (2004) used the CFC-12 questionnaire, whereas the current study used the CFC-14 questionnaire. The CFC-12 questionnaire measures CFC as a one-factor continuum without subscales, and the CFC-14 questionnaire measures CFC as two

continuums divided into subscales. This may account for differences in results. It is uncertain whether effects found by Orbell and colleagues (2004) are explained by a relationship between CFC-future or CFC-immediate since they do not measure these constructs separately. Orbell and colleagues (2004) found that high CFC participants had higher intention to participate in cancer screening than low CFC participants. However, the current study shows a difference between intention of high CFC-future participants and high CFC-immediate participants. A high CFC-future score correlates positively with intention to eat sufficient amounts of fruit and vegetables, but a high CFC-immediate score correlates negatively with intention to eat sufficient amounts of fruit and vegetables. Thus, if participants have a high CFC-future score, they have higher intention to eat sufficient amounts of fruit and vegetables, and if participants have a high CFC-immediate score, they have a lower intention to eat sufficient amounts of fruit and vegetables. In other words, the relationship between high CFC and cancer screening found by Orbell and colleagues (2004) may occur because people concerned with the immediate consequences of their actions are less likely to participate in cancer screening, but this cannot be known for sure since they do not measure CFC-future and CFC-immediate separately. The current study, however, does measure them separately but does not show a moderating effect of CFC-future nor CFC-immediate. Thus perhaps the results differ due to different conceptualizations of CFC.

Secondly, Orbell and colleagues (2004) used messages concerning cancer screening, whereas the current study used messages concerning constipation as a consequence of eating too few fruit and vegetables. It is conceivable that cancer screening has more potential to enlarge the effect of temporal framing than constipation does. Cancer screening is not an intervention that people are confronted with very often. Maintaining a healthy diet is something that *is* advertised more often and can be applied on a daily basis. Thus, people may already be aware that they should eat sufficient amounts of fruit and vegetables, and already have a strong intention to do so, which could explain why one single message will not strengthen intention further. Another difference between cancer screening and following a healthy diet is that cancer screening is the only way to detect cancer as where following a healthy diet is not the only way to relieve constipation. This can make cancer screening seem more necessary compared to following a healthy diet. In addition, it is conceivable people are more afraid of cancer screening than of constipation. Cancer is a disease that cannot be cured easily, whereas constipation can be gone in a few days. Thus the intensity and duration of cancer are higher. So, Orbell and colleagues (2004) make more use of fear-appeal than the current study does, which might explain why one message concerning cancer screening does have an effect on intention, whereas one message concerning constipation does not. Fearappeal is used in fear-arousing persuasive messages (Peters, Ruiter, & Kok, 2013) which are effective at influencing attitude, intention, and behaviour (Tannenbaum et al., 2015). Perhaps if the current study had made use of consequences that evokes more fear – diabetes, for example – the results would more closely resemble those of Orbell and colleagues (2004). The pre-test of the message did show that constipation was seen as less negative than diabetes. However, when using more long-term fear-evoking consequences to apply CFC to temporal framing, one should consider whether the short-term messages remains realistic. Thus there should be a balance between fear-appeal and realism.

Orbell and colleagues (2004) also found that the effect of temporal framing on intention was mediated by attitude and PBC. However, the current study did not replicate this. The previously described difference of content of the messages could also explain why Orbell and colleagues (2004) found the mediating relationship of attitude and PBC, and the current study did not. If the effect of the message on intention is not strong enough, mediation can be harder to find. The current study did find a direct relationship between attitude and intention, and a direct relationship between PBC and intention. Thus, when participants have a strong intention to eat enough fruit and vegetables, they also have a positive attitude towards eating enough fruit and vegetables, and see themselves as capable of eating enough fruit and vegetables. Although the third and fourth hypotheses were not confirmed, the Theory of Planned Behaviour (TPB; Ajzen, 1985) was supported. According to this theory, intention is determined by attitude, PBC, and subjective norms (which was not tested in the current study). By finding a relationship between attitude and intention, and PBC and intention, the current study supports the TPB.

One relationship was as expected; the results showed no direct effect of temporal framing on intention. Whether messages were framed short- or long-term did not affect the participants' intention to eat sufficient amounts of fruit and vegetables. These results add to the discussion concerning the moderating effect of valence framing on temporal framing. Chang and Lee (2009) found that negatively long-term framed messages have a stronger effect on intention than negatively short-term framed messages. However, Chandran and Menon (2004) showed the opposite, negatively short-term framed messages are more persuasive than negatively long-term framed messages. The current study contradicts both studies and showed no difference in the effect of negatively framed short- and long-term messages on intention. Since the results of the current study did not show an effect of temporal framing, the Construal Level Theory (CLT; Trop & Liberman, 2003) was not

supported. The CLT states that proximal events are more concrete, and thus easier to motivate for than events in the future, which are seen as more abstract. This theory would predict that short-framed messages have a stronger effect on intention since they are seen as more concrete. However, the current study did not find a difference between the effect of short- and long-term messages, thus, as far as this study is concerned, the CLT is not supported – as previously mentioned, however, this might be due to the lack of fear-appear of the message used in this study.

In the end, not finding any relationships could also mean that there are no relationships to be found. It could be that reading just one single message anticipated on someone's' consideration of future or immediate consequences is not enough to change someone's intention to eat sufficient amounts of fruit and vegetables. To conclude, the two research questions of the current study are answered: (1) the results did not show that CFC-future or CFC-immediate moderates the effect of temporal framed messages on intention to eat sufficient and vegetables, but (2) the results do show that attitude and PBC influence the intention. However, the results do not show that they do not mediate the relationship between temporal framing and intention.

## Limitations

There are the usual limitations of most studies that this study is also affected by, like a small sample size of the pretest, lack of pre-measuring intention before exposing participants to messages, and subjectivity of using questionnaires. However, two limitations are worth discussing in more detail.

Firstly, the results of the CFC-14 questionnaire should be interpreted with care. Many participants commented on CFC-14 items, indicating that they did not understand the questions and the words used were not in their vocabulary. This is problematic for further use of the CFC-14 questionnaire, considering that the sample of the current study was higher educated in comparison to the general population. When participants indicate that they do not understand questions, it cannot be known for sure whether the questionnaire measures the construct that it was designed to measure. Answers that participants give to questions they do not understand cannot be a good representation of their actual behavior. However, when looking at the reliability tests, the CFC-14 subscales both proved to be reliable. This could mean that either participants guessed all questions in the same direction, or participants did have a vague understanding of the meaning of the questions. Either way, it is worth keeping in mind that participants experienced difficulty with understanding the CFC-14 questionnaire.

The second limitation that is worth discussing is the representativeness of the target group of the message in the current study. Because of financial reasons participants were recruited with snowballing in the direct environment of the researcher. A consequence of this recruiting method is that the majority of the sample is higher educated. According to RIVM (2017) higher educated people eat more fruit and vegetables than lower educated people. This makes higher educated people not the target group which should increase fruit and vegetable intake and thus the sample would not be representative for the target group of the messages. However, the current study only included participants in the analyses who indicated that they do not eat sufficient amounts of fruit and vegetables. By doing so, an attempt was made to reach the target group of the message. Nevertheless, the sample is still higher educated than the population and this could have affected the results. Higher educated people are already aware of consequences of eating unhealthy and healthy diets (Dickson-Spillmann, & Siegrist, 2011), but perhaps they choose not to adhere to these because they prefer their own diet. Thus informing them even more about consequences of unhealthy diets may not be effective.

## **Recommendations for further research and implications**

Based on the results and limitations of the current study, recommendations for further research can be made. Firstly, one could more closely look at the CFC-14 questionnaire. Since participants indicated that they did not understand the questions, the CFC-14 should be tested on different groups and there could be considered rewriting questions in a more understandable language. Secondly, the comparison between the current study and Orbell and colleagues' study (2004) showed that messages focusing on negative consequences of interventions can lead to different results than messages focusing on consequences of not adhering to interventions. Future research could find out which strategy is most effective for which intervention. Perhaps messages conveying interventions with many negative consequences could focus on consequences of not adhering to interventions. Thirdly, further testing the effects of temporal framing and CFC could be done with stronger messages. Perhaps when using stronger messages, moderating effects of CFC-future and CFCimmediate on intention will be found and people can be encouraged to maintain a healthy diet. Stronger messages are, for example, messages which contain interventions which people are not too familiar with, for which people do not already have a high intention to carry out, and which evoke more fear than constipation did. In addition, participants can be exposed repeatedly to these messages to enlarge the effects even more. The repeated exposure could be implemented with messages conveying different interventions and consequences of overweight. For example, the intervention eating less sugar can be linked to the consequence of a reduced chance of a heart attack. In this way, messages developed in the current study can be used in a larger campaign to help people maintain a healthy diet and reduce overweight. Perhaps when implementing a larger campaign with multiple arguments and interventions for maintaining a healthy diet, people are more easily convinced and see arguments or interventions they are not familiar with. These can be implemented in self-help websites, dieticians, medical settings, or other situations in which personal details of patients are known and to which patients return multiple times.

In general, more research could be done to develop effective interventions that encourage people to maintain a healthy diet. Since the current study did not show an effect of persuasive health messages other interventions should be studied and considered. For example, educational programs, nudging, or food-labels. Especially if-then implementation intentions interventions have proven to increase the intention to eat sufficient amounts of fruit and vegetables (Chapman, Armitage, & Norman, 2009). Future research could look into combining the CFC-orientation with if-then implementation. In the end, the goal is to develop an intervention that establishes sufficient amounts of fruit and vegetable intake in order to tackle the obesity problem in The Netherlands.

### Conclusion

To summarize, the intention to eat sufficient amounts of fruit and vegetables is not influenced by the interplay between temporal framing and CFC-future or CFC-immediate. Neither is the effect of temporal framing on intention mediated by attitude or perceived behavioral control. From these results can be concluded that persuasive health messages concerning fruit and vegetable intake do not benefit from the anticipation of the individual differences in CFC if the consequence *constipation* is used. This gives only more reason to look into other ways of developing effective persuasive health messages to establish a healthier lifestyle and reduce the number of people who suffers from overweight.

# Appendix A

# Persuasive health messages

# Short-term framed health message

Eating a sufficient amount of fruit and vegetables is very important. When you don't eat enough fruit and vegetables you'll miss important nutrients and fibres which will have consequences for your health. You'll have, for example, a higher chance of getting <u>constipation in the next few days</u>. It is therefore important to eat enough fruit and vegetables.

# Long-term framed health message

Eating a sufficient amount of fruit and vegetables is very important. When you don't eat enough fruit and vegetables you'll miss important nutrients and fibres which will have consequences for your health. You'll have, for example, a higher chance of getting <u>constipation more often in the next few years</u> It is therefore important to eat enough fruit and vegetables.

# **Appendix B**

# Questionnaires

# CFC-14 scale

F = CFC-future subscale item; I = CFC-immediate subscale item. Respond to each item on a 7-point scale (1 = very uncharacteristic of me; 7 = very characteristic of me).

- 1. I consider how things might be in the future and try to influence those things with my day to day behaviour. (F)
- 2. Often I engage in a particular behaviour in order to achieve outcomes that may not results for many years. (F)
- 3. I only act to satisfy immediate concerns, figuring the future will take care of itself. (I)
- 4. My behaviour is only influenced by the immediate (i.e. a matter of days or weeks) outcome of my actions. (I)
- 5. My convenience is a big factor in the decisions I make or the actions I take. (I)
- 6. I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes. (F)
- 7. I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years. (F)
- 8. I think it is more important to perform a behaviour with important distant consequences than a behaviour with less important immediate consequences. (F)
- 9. I generally ignore warnings about possible future problems because I think the problem will be resolved before they reach crisis level. (I)
- 10. I think that sacrificing now are usually unnecessary since future outcome can be dealt with at a later time. (I)
- 11. I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date. (I)
- 12. Since my day-to-day work has specific outcomes, it is more important to me than behaviour that has distant outcomes. (I)
- 13. When I make a decision, I think about how it might affect me in the future. (F)
- 14. My behaviour is generally influenced by future consequences. (F)

# Theory of planned behaviour measures

A = attitude, PBC = perceived behaviour control, I = intention.

- Eating enough fruit and vegetables would be answered on scales from worthwhile– worthless, necessary–unnecessary, good–bad, important– unimportant, pleasant– unpleasant, beneficial–harmful, desirable– undesirable, and nice–nasty. (A)
- 2. I am confident that I could eat enough fruit and vegetables answered on a scale from very sure I could–very unsure if I could. (PBC)
- 3. For me to eat enough fruit and vegetables would be . . . answered on a scale from very easy-very difficult. (PBC)
- 4. For me to eat enough fruit and vegetables would be . . . answered on a scale from totally under my control-totally outside of my control. (PBC)
- 5. I am confident that I could eat enough fruit and vegetables, answered on a scale from very confident–not at all confident. (PBC)
- 6. I intend to eat enough fruit and vegetables. (strongly agree-strongly disagree). (I)
- 7. How likely is it that you are going to eat enough fruit and vegetables? (very likely–very unlikely). (I)
- 8. I intend to eat enough fruit and vegetables (definitely intend– definitely do not intend).(I)

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