Temporal Framing and the Decision to Take Part in Type 2 Diabetes Screening: Effects of Individual Differences in Consideration of Future Consequences on Persuasion

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Reliable individual differences in the extent to which people consider the long- and short-term consequences of their own behaviors are hypothesized to influence the impact of a persuasive communication. In a field experiment, the time frame of occurrence of positive and negative consequences of taking part in a proposed Type 2 diabetes screening program was manipulated in a sample of 210 adults with a mean age of 53 years. Individual differences in consideration of future consequences (CFC; A. Strathman, F. Gleicher, D. S. Boninger, & C. S. Edwards, 1994) moderated (a) the generation of positive and negative thoughts and (b) the persuasive impact of the different communications. Low-CFC individuals were more persuaded when positive consequences were short term and negative consequences were long term. The opposite was true of high-CFC individuals. Path analyses show that net positive thoughts generated mediated the effect of the CFC × Time Frame manipulations on behavioral intentions.

**Keywords:** temporal framing, Type 2 diabetes screening, consideration of future consequences, theory of planned behavior, health communication

Do you want to know if your long-term health is at risk, or would you prefer to leave well enough alone? One important domain of behavioral decision making in which short- and long-term consequences are particularly salient is that of health screening. Screening involves inviting people who are asymptomatic to undergo a medical test to determine if they are ill or are likely to become so, in order to prevent serious illness. As such, men and women are faced with the dilemma of whether to risk upsetting their current state of ignorance regarding their health by undergoing testing, treatment, or lifestyle changes in order to offset the risk of a long-term health threat. Consequently, the decision to take part in health screening has been characterized by some theorists (e.g., Rothman & Salovey, 1997) as a "risky behavioral decision," in contrast to other behavioral decisions that involve little short-term risk and relatively certain gains.

Reliable individual differences in the extent to which people attach to the short- and long-term consequences of their behaviors can be assessed by the Consideration of Future Consequences (CFC) Scale (Strathman et al., 1994; see also Petrocelli, 2003). The present research starts from the assumption that these individual differences will guide the persuasive impact of a health communication. Various approaches have been taken to the issue of designing effective health communications. For example, personally tailoring message content has been shown to enhance motivation for behavior change (e.g., Kreuter, Bull, Clark, & Oswald, 1999; Skinner, Strecher, & Hospers, 1994). Studies have also examined the effects of framing in terms of losses versus gains and demonstrated that loss-framed messages are more persuasive in the context of preventive behaviors (e.g., Detweiler, Bedell, Salovey, Pronin, & Rothman, 1999; Meyerowitz & Chaiken, 1987; Rothman & Salovey, 1997; Rothman, Salovey, Antone, Keough, & Martin, 1993; Schneider et al., 2001). The present experimental study addresses a further aspect of health communications, the temporal frame in which the costs and benefits of a health-related behavior might occur and the relationship of individual differences in CFC to the persuasive impact of different temporal frames.

These processes are examined in the context of an important contemporary health issue, namely diabetes and its consequences. In the United States, approximately 18.2 million people are estimated to have diabetes, and diabetes was the sixth leading cause of death in 2000 (National Institute of Diabetes and Digestive & Kidney Diseases, 2003). Diabetes is known to affect about 1.3 million people in England, of whom approximately 85% have Type 2 diabetes. Average life expectancy in people who have acquired Type 2 diabetes is reduced by 10 years largely because of premature excess mortality from coronary heart disease and stroke. There is a substantial population, estimated to be 600,000 to 800,000 of asymptomatic, and therefore undiagnosed and untreated, individuals with Type 2 diabetes (Department of Health, 2002). In the United Kingdom, the Department of Health is considering the possible introduction of nationwide screening for Type 2 diabetes among people aged 40 years and over. Because it is possible that this form of screening may be made available to the
general population in the next few years, it is timely to initiate research that might contribute to effective health promotion.

Consideration of Future Consequences

Individual differences in CFC represent a cognitive mind-set that determines the extent to which an individual is influenced by potential immediate and distant outcomes in deciding how to act. When confronted with a behavioral decision, with one set of immediate outcomes and one set of longer term outcomes, the resolution of this dilemma is proposed to be a relatively stable individual characteristic. People with low CFC are expected to focus more on immediate needs and concerns and to act accordingly, whereas people with high CFC are expected to focus more on the future implications of their behavior and use these longer term outcomes as guides to their behavioral decision making (Strathman et al., 1994; see also Insko et al., 1998; Joireman, 1999; Joireman, Lasane, Bennett, Richards, & Solaimani, 2001; Joireman, Van Lange, et al., 2001; Lindsay & Strathman, 1997).

The concept of time orientation would seem to have obvious implications for health-related behaviors. Research using a conceptually similar instrument, the Stanford Time Perspective Inventory (Gonzalez & Zimbardo, 1985; Polak & Zimbardo, 1990; Zimbardo & Boyd, 1999) has shown that a future time perspective may be associated with delaying first sexual intercourse (Rothspan & Read, 1996) or not engaging in risky driving (Zimbardo, Keough, & Boyd, 1997). Although these studies are suggestive of a predictive relationship between CFC and health behavior, to date only one previous study (Orbell, Perugini, & Rakow, 2004) has considered the implications of CFC for health-related decision-making.

Consideration of Future Consequences and Temporal Framing of Behavioral Outcomes

CFC is proposed to guide the processing of information and formation of attitudes and intentions with regard to behavior. A conservative test of the hypothesized consequences of CFC might be afforded if individuals are confronted with information about both positive and negative outcomes of a behavior, but the time frame in which those outcomes are proposed to occur is manipulated. This is because although the positive or negative nature of behavioral outcomes is anticipated to drive the direction of their persuasive influence, the salience of those outcomes to people high or low in CFC will be determined by the time frame in which those outcomes are said to occur. Strathman et al. (1994, Study 1) manipulated the time frame of occurrence of positive and negative outcomes of increased oil drilling and obtained evidence that the interaction of CFC with time frame influenced attitudes in line with theoretical predictions. Although Strathman and colleagues examined attitude toward an environmental policy, a more precise test of the effects of temporal frame on persuasion might involve a personal behavioral decision with more direct personal consequences.

Virtually all health-related behaviors can be considered to possess associated positive and negative outcomes (Wilson, Purdon, & Wallston, 1988). Indeed, consideration of costs and benefits is fundamental to theoretical accounts of health-related decision making (Orbell, in press), such as the health belief model (Janz & Becker, 1984) and protection motivation theory (in which costs and benefits of behavior are referred to as “response costs” and “response efficacy”; Rippetoe & Rogers, 1987; Rogers, 1975). Studies of screening behaviors have shown that a variety of costs, such as aversive aspects of a test procedure, or risk of a positive result and benefits, such as reduced long-term health risk or peace of mind, are associated with both intentions and actual uptake of screening (e.g., Orbell, Crombie, & Johnston, 1996; Orbell & Sheeran, 1993, 1998; Rutter, 2000; Wardle et al., 2000). We theorized that if the time frame in which these positive and negative outcomes were described to occur was manipulated to be either immediate or lasting for years, we might show that low-CFC respondents would be more persuaded and more likely to intend to undergo screening when positive outcomes are described as immediate and negative outcomes are described as long term. Conversely, we anticipated that high-CFC respondents would be more persuaded and more likely to intend to undergo screening when positive outcomes are described as long term and negative outcomes are described as immediate.

Mediators of Temporal Framing on Behavioral Intentions

An important issue for research concerning health communications is to understand how they might influence intentions and behaviors. Several studies involving different types of health communications have failed to demonstrate effects on intentions or their proximal determinants (Rothman & Salovey, 1997; Wilson et al., 1988). Strathman et al. (1994) demonstrated that their manipulation of time frame influenced individual item measures of attitude toward increased oil drilling. Orbell et al. (2004) extended this finding by showing that time frame influenced attitude and perceived behavioral control from the theory of planned behavior (TPB; Ajzen, 1985, 1991, 2001) with respect to a behavioral decision to undergo screening for colorectal cancer. The present experiment extends the investigation of mediators of temporal framing to consideration of affective processes.

A number of researchers have suggested that the role of affect in the formation of a behavioral intention has been neglected (e.g., Perugini & Bagozzi, 2001; Richard, van der Plight, & de Vries, 1996a, 1996b). Particular attention has been paid to the anticipated affective consequences of “not acting,” referred to as anticipated regret. Regret is proposed to be an emotion that people want to avoid, which consequently might strengthen behavioral intentions because it binds people to their intentions by associating failure to act with aversive affect (Abraham & Sheeran, 2003; Gilovich & Medvec, 1995; Steptoe, Doherty, Kerry, Rink, & Hilton, 2000). To date, research concerning the role of anticipated regret in enhancing behavioral intention has focused on health protective behaviors such as exercise or condom use. Although the concept of the anticipated negative affective consequences of not acting may have direct motivational power in the context of a behavior with low risk and relatively certain gains, in the context of screening it seems possible that anticipated negative affect may also occur in relation to “acting” and to obtaining either an abnormal or a normal result. As it seems likely that the relative salience of regret associated with attending screening and obtaining an abnormal or normal result or with not attending screening may differ with CFC, we assessed each of these forms of anticipated affect. Affect associated with the thought of developing disease is also an im-
portant component of accounts of health-related behavior such as protection motivation theory (Maddux & Rogers, 1983). Fear of disease is conceptualized by protection motivation theory as a threat appraisal variable, which is proposed to enhance the development of protection motivation and is distinct from anticipated regret with respect to acting or not acting. The present study examines the role of attitude, subjective norm, and perceived behavioral control together with anticipated regret and fear of disease as potential mediators of the effects of temporal framing and CFC on behavioral intention.

Summary of the Present Study Hypotheses

The present experiment evaluates the role of temporal frame and individual differences in CFC in the context of a behavioral intention to take part in screening for Type 2 diabetes if it were to be offered. Health screening in the United Kingdom is funded nationally and organized locally by the National Health Service and is free at the point of delivery. Thus, if screening were to be introduced, men and women would be sent individual invitations to participate. We hypothesized that CFC would exert a main effect on participants’ responses. As screening aims to prevent the longer term complications associated with Type 2 diabetes, we anticipated that people higher in CFC would hold more positive intentions to participate.

The main study hypothesis concerned the interaction of CFC and time frame. High-CFC individuals were expected to be more sensitive to distant consequences that are both positive and negative, whereas low-CFC individuals were expected to be more sensitive to immediate consequences that are both positive and negative. We hypothesized that high-CFC participants would generate more positive relative to negative thoughts and be more motivated (in terms of positive attitudes, subjective norms, perceived behavioral control, higher anticipated regret and appraised fear, and more positive intentions) when the positive consequences of screening were framed as long term and the negative consequences were framed as short term, whereas low-CFC participants would be more favorably disposed toward screening when presented with short-term positive and long-term negative consequences. Conversely, high-CFC participants were expected to produce fewer positive relative to negative thoughts and be less motivated to participate in screening when the negative consequences were presented as long term and positive consequences were presented as short term. Low-CFC participants, in contrast, were expected to be least favorably disposed toward screening when negative consequences were presented as short term and positive consequences were presented as long term. The final study hypothesis concerned the mediation of intention. We hypothesized that the effects of CFC and the time frame manipulation would influence intention via effects on positive and negative thoughts, attitude, subjective norm, perceived behavioral control, anticipated affect, and fear of diabetes.

Method

Participants

A community sample of 210 men (n = 74) and women (n = 136) acted as participants in the experiment (mean age = 53.59 years, SD = 9.95). Participants were recruited by means of visits to households in one U.K. town. Households with at least one person in the target age range for screening were asked to participate. The response rate was 85% of age-eligible individuals. Carstairs Index of Social Deprivation scores (Carstairs & Morris, 1989) were available for postcodes provided by 176 (83%) of participants and ranged from −3.28 to 5.71 (M = 0.80, SD = 2.28), where positive scores indicate lower socioeconomic status. Ninety-four percent of the sample was White European.

Materials

Participants were invited to take part in a study of their views about a proposed screening program for Type 2 diabetes. A questionnaire was left with participants to complete and collected at a later date, at which time participants were given a letter thanking them for their cooperation in the study. A 2 × 2 factorial design was used to test the study hypotheses. Time frame and order effects were manipulated, whereas CFC was a measured variable. As an initial check on the relevance of the issue, participants were asked to answer a series of questions about diabetes: “Do you consider diabetes to be a serious condition? (yes–no),” “Do you personally know anyone who has diabetes? (yes–no),” “Have you given any thought to diabetes? (No it has never crossed my mind—I think about it frequently).”

Manipulations. Each version of the questionnaire contained one of four passages about Type 2 diabetes and diabetes screening, preceded by the instruction “Now please read this.” All four versions began with two paragraphs describing the prevalence and nature of Type 2 diabetes. These paragraphs were included because pilot work suggested that Type 2 diabetes was not well understood.

There are 2 types of diabetes. The most common type of diabetes is called TYPE 2 DIABETES. Of the 1.3 million people in England who have diabetes, 85% of them have Type 2 diabetes. People who have Type 2 diabetes are more likely to develop heart disease, stroke, eyesight problems, kidney failure, problems with feet, and impotence. Life expectancy in people with Type 2 diabetes is reduced by ten years. The complications of having diabetes can be prevented by controlling diet, increasing activity and by taking tablets prescribed by a doctor.

Type 2 diabetes can develop in people who are obese, have a poor diet, and who are physically inactive. The chance of developing diabetes increases with age. It is possible for someone to have Type 2 diabetes and not to know it yet because they show no symptoms and do not feel unwell. The Department of Health estimates that there are between 600,000 and 800,000 people in this country who do not know that they have diabetes.

Following these two paragraphs, each questionnaire included one of four different versions of a third paragraph. Each of the passages contained two possible positive consequences of taking part in screening and two possible negative consequences of taking part in screening. Although the same consequences were presented in each passage, the time frame of these consequences was manipulated. In one time frame, the negative consequences were presented as short term and the positive consequences were presented as long term. In the second time frame (shown in brackets), the positive consequences were presented as short term and the negative consequences were presented as long term. The order in which the positive and negative consequences were presented within each time frame was also manipulated to control for order effects:

The Department of Health is considering offering all men and women over 40 years of age a free screening test for Type 2 diabetes in the next few years. Some people find that taking part in screening means that they have to undergo unpleasant and inconvenient procedures immediately. They may also find they start worrying about diabetes and may have to start taking tablets and changing their lifestyle.
immediately. Some people find that taking part in screening gives them peace of mind about their health for years into the future and they also know that their early diagnosis will prevent complications and illness in years to come. [Some people find that taking part in screening gives them immediate peace of mind about their health and they also know that getting an immediate diagnosis will ensure that action can be taken immediately when it will be most effective in preventing illness. Some people find that taking part in screening means that they have to undergo unpleasant and inconvenient procedures for years into the future. They also find that they worry about their condition and have to take tablets and live a different lifestyle for the rest of their life.]

Thought listings. Immediately after reading the time frame manipulation, participants completed a thought-listing task to assess their cognitive responses (Cacioppo, Harkins, & Petty, 1981; Das, de Wit, & Stroebe, 2003; Kreuter et al., 1999). Participants were asked, “Please write down the thoughts that came to mind as you read the paragraphs above.” A box was provided for thought listings. Thought listings made by participants were independently coded as positive, negative, or neutral/irrelevant thoughts by two raters who were unaware of condition and CFC score. Positive thoughts were defined as any thought representing a positive evaluative orientation toward Type 2 diabetes screening; negative thoughts represented a negative evaluative orientation. Interrater reliability was satisfactory ($\alpha = .87$ for positive thoughts and .81 for negative thoughts, both $p < .01$).

Theory of planned behavior and anticipated affect measures. After completing the thought listings, participants responded to a series of items to assess constructs specified by the TPB, anticipated negative affect, and fear of diabetes. Six-point Likert scales were used to assess each of the dependent variables. Attitude was assessed by the item “For me to take part in type two diabetes screening, if it were offered to me in the next few years, would be . . . (worthwhile–worthless, necessary–unnecessary, good–bad, important–unimportant, pleasant–unpleasant, beneficial–harmful, desirable–undesirable, wise–unwise).” Alpha was .89. Subjective norm was assessed by three items: “Most people who are important to me would think I should take part in type two diabetes screening if it were offered to me in the next few years (Strongly agree–strongly disagree),” “Most people who are important to me would encourage/discourage me to take part in type two diabetes screening if it were offered to me in the next few years (Strongly encourage–strongly discourage),” and “Most people who are important to me would approve/disapprove of my taking part in type two diabetes screening if it were offered to me in the next few years (Strongly approve–strongly disapprove).” Alpha was .69. Four items assessed perceived behavioral control: “I am sure that I could take part in screening for type two diabetes if it were offered to me in the next few years (Very sure that I could–very unsure that I could),” “For me to take part in type two diabetes screening in the next few years, if it were offered to me, would be (Very easy–very difficult),” “For me to take part in screening for type two diabetes in the next few years, if it were offered to me, would be (Totally outside my control–totally under my control),” and “I am confident that I could take part in screening for type two diabetes if it were offered to me in the next few years (Very confident–not at all confident).” Alpha was .80.

Intention was measured by four items: “I intend to take part in screening for type two diabetes if it is offered to me in the next few years (Strongly agree–strongly disagree),” “How likely is it that you would take part in screening for type two diabetes if it were offered to you in the next few years? (Very likely–very unlikely),” “I intend to take part in screening for type two diabetes if it were offered to me in the next few years (definitely intend–definitely do not intend),” and “I plan to take part in screening for type two diabetes if it were offered to me in the next few years (Definitely do–definitely do not).” Alpha was .81.

Three measures of anticipated affect were included in the study. Each measure was answered on one of the following scales: regretful—not regretful, relieved—not relieved, sorry—not sorry, worried—not worried, and pleased—not pleased. The first ($\alpha = .88$) assessed emotion associated with a normal screening result: “If I am offered the chance to take part in screening for type two diabetes in the next few years and I take part and no problems are found I will feel. . . .” The second ($\alpha = .87$) assessed emotion associated with not taking part in screening: “If I am offered the chance to take part in screening for type two diabetes in the next few years and I do not take part I will feel. . . .” A third measure ($\alpha = .79$) assessed emotion associated with an abnormal screening result: “If I am offered the chance to take part in screening for type two diabetes in the next few years and I take part and diabetes is found and treated I will feel. . . .” Finally, a measure of fear associated with getting diabetes was included: “The thought of getting type two diabetes makes me feel (Very scared—not at all scared, very anxious–not at all anxious, very frightened—not at all frightened),” Alpha was .91. All scale scores were averaged, giving a score between 1 and 6 for each variable. Measures were coded such that higher scores indicate more positive motivation and more negative affect.

Consideration of future consequences. The final part of the questionnaire consisted of the 12-item CFC measure (Strathman et al., 1994). Respondents were required to indicate to what extent each item was characteristic of themselves on a 5-point Likert scale ranging from 1 (extremely characteristic) to 5 (extremely uncharacteristic). Example items are “I often consider how things might be in the future and try to influence those things with my day to day behavior,” “I only act to satisfy immediate concerns, figuring the future will take care of itself,” and “I think that sacrifice now is usually unnecessary since future outcomes can be dealt with at a latter time.” A high score indicates greater consideration of future consequences. The scale has high internal reliability ($\alpha = .80, .82$, .86, and .81, respectively, in four college samples) and test–retest reliability ($rs = .76$ and .72 over 1 week and over 5 weeks, respectively). CFC shows convergent validity ($r = .49$) with the Conscientiousness dimension of the Big Five Personality Inventory (Goldberg, 1992) and the Stanford Time Perspective Inventory ($r = .36$; Zimbardo, 1990; see also Zimbardo & Boyd, 1999). Moreover, Strathman et al.’s Study 2 showed that CFC is able to account for significant independent variance in general health concern, cigarette use, and environmental behavior after taking account of variance explained by these measures.

Results

Completed booklets were available for 96 participants in the short-term positive, long-term negative (ST+, LT-) condition and 114 in the long-term positive, short-term negative (LT+, ST-) condition. There was no significant difference in the gender composition of the two conditions, $\chi^2(1, N = 210) = 0.85$, ns. Nor was there any difference in the mean age ($Ms = 53.59$ and 53.58 years, respectively), $t(208) = 0.01$, ns, or deprivation scores ($Ms = .96$ and .66, respectively), $t(174) = 0.85$, ns, between conditions.

Consideration of Future Consequences

The 12 items assessing CFC had excellent internal reliability ($\alpha = .93$), consistent with previous studies. Mean scores were computed, ranging from 1 to 5. The mean score in the present sample was 3.25 ($SD = .96$). Mean scores obtained in previous studies ranged from 4.84 among undergraduates (Joireman, Lasane, et al., 2001), 3.87 among commuters with an average age of 38 years (Joireman, Van Lange, et al., 2001), and 3.20 among a sample of 50- to 69-year-olds (Orbell et al., 2004). Within the present sample, CFC was not associated with age ($r = .03$, ns), Carstensen score ($r = -.04$, ns), or gender, $t(208) = .83$, ns. The median CFC score was 3.33, and the sample was divided into high and low CFC at the median for subsequent analyses of variance.
CFC was retained as a continuous measure in path analyses. There was no significant association between CFC and experimental group, \(\chi^2(1, N = 210) = .31, ns\).

**Diabetes Salience**

Only 18% of participants reported that “diabetes has never crossed my mind,” 11% reported that “diabetes has crossed my mind once,” and 30% reported that “diabetes has crossed my mind a few times.” The modal response, by 32%, was that “diabetes comes to mind every now and then when I am reminded of it.” Seven percent reported that “it comes to mind quite a lot,” and 3% reported “I think about it frequently.” The majority of participants (86%) agreed that diabetes is a serious condition, and 72% reported knowing someone with diabetes. These findings indicate that diabetes was relevant to the sample.

Extent of thought given to diabetes was not associated with participant age \( (r = .06, ns)\), social deprivation index \( (r = -.05, ns)\), or with participant gender \( (M_s = 2.92 \text{ and } 3.15, \text{ respectively,}\) for men and women), \( t(208) = -1.262, ns\). However, extent of thought given to diabetes was associated with CFC score \( (r = .14, p < .05)\) indicating that people with higher CFC were more likely to have given thought to diabetes.

**Effects of the Manipulations on Thought Listings**

Participants generated between zero and three thoughts about diabetes screening \( (M = 1.33, SD = .71)\). We hypothesized that high-CFC participants might be expected to generate more positive thoughts (and fewer negative thoughts) when confronted with information about long-term positive consequences and short-term negative consequences, whereas we expected low-CFC participants to generate more positive thoughts (and fewer negative thoughts) when confronted with information about short-term positive consequences and longer term negative consequences.

To test the hypothesis, we conducted a \(2 (\text{time frame: long-term positive vs. short-term positive}) \times 2 (\text{order: positive first vs. negative first}) \times 2 (\text{type of thoughts: positive vs. negative})\) mixed analysis of variance (ANOVA) in which positive and negative thoughts were treated as a within-participants variable. The ANOVA revealed first that participants generated more positive thoughts \( (M = 1.10, SD = .74)\) than negative thoughts \( (M = .25, SD = .48)\) about diabetes screening, consistent with a generally positive response to the persuasive message, \(F(1, 202) = 145.76, p < .01\). Importantly, we also obtained the predicted Type of Thoughts \(\times\) CFC \(\times\) Time Frame interaction, \(F(1, 202) = 9.88, p < .01\). Figure 1 shows the difference between the number of positive and negative thoughts generated by high- and low-CFC participants in each of the time frame conditions. High-CFC participants generated more positive relative to negative thoughts in the long-term positive consequences condition \( (M_s = 1.36 \text{ positive and } 0.12 \text{ negative})\) than in the short-term positive consequences condition \( (M_s = 1.02 \text{ positive and } 0.35 \text{ negative})\). Low-CFC participants, as expected, generated more positive thoughts relative to negative thoughts when presented with information regarding short-term positive consequences \( (M_s = .87 \text{ positive and } .27 \text{ negative})\). These findings indicate the success of our manipulations. The interactions of Time Frame \(\times\) Type of Thoughts, \(F(1, 202) = .93, ns\), and CFC \(\times\) Type of Thoughts, \(F(1, 202) = 1.91, ns\), were each nonsignificant. No significant order effects were obtained in these or any of the subsequent analyses and are not discussed further.\(^1\)

**Effects of the Manipulations on TPB Variables and Anticipated Affect**

Mean scores for the measures of attitude, subjective norm, perceived behavioral control and intention were all above scale midpoints, indicating a generally positive motivation with regard to diabetes screening \( (M_s = 4.85, 4.85, 5.14, \text{ and } .470, \text{ respectively})\). Within-participants ANOVA showed that scores on each of the measures of affect differed significantly from each other, \(F(3, 627) = 398.59, p < .01\). Participants anticipated more negative

\(^1\) As CFC was shown to be associated with amount of thought given to diabetes before the manipulations, we also conducted the \(2 \times 2 \times 2\) mixed ANOVA with the inclusion of the “thought given to diabetes” measure as a covariate. The analysis revealed an identical pattern of results, namely a significant effect of type of thought, \(F(1, 201) = 13.83, p < .01\), and a significant Type of Thoughts \(\times\) CFC \(\times\) Time Frame interaction, \(F(1, 201) = 9.52, p < .01\).
affect “If I do not take part” (M = 4.67, SD = 1.19) compared with “If I take part and diabetes is found and treated” (M = 2.25, SD = 1.09) or “If I take part and no problems are found” (M = 1.31, SD = .77). Fear “if I get diabetes” had a mean of 4.06 (SD = 1.40).

To test the main experimental hypothesis, we subjected attitude, subjective norm, perceived behavioral control, intention, and the four measures of anticipated negative affect to a 2 (time frame: long-term positive vs. short-term positive) \( \times 2 \) (order: long-term first vs. short-term first) \( \times 2 \) (CFC: high or low) multivariate analysis of variance (MANOVA). Results revealed a significant main effect of CFC, \( F(1, 195) = 2.47, p < .05 \). Univariate analysis indicated that attitude, subjective norm, perceived behavioral control, intention, and the four anticipated affect variables contributed to this effect (see Table 1). As hypothesized, high-CFC individuals held more positive attitudes, subjective norms, perceived behavioral control beliefs, and intentions toward screening. Table 1 also shows an interesting pattern of associations between anticipated affect and CFC. Overall, all participants, regardless of CFC, were more concerned about not taking part in screening than about taking part. However, high-CFC participants were more fearful than low-CFC participants of the thought of developing diabetes (MS = 4.35 and 3.78, respectively) and also anticipated more regret if they did not take part in screening (MS = 4.98 and 4.38, respectively). In contrast, low-CFC participants anticipated more regret than high-CFC participants if they took part in screening and no problems were found (MS = 1.42 and 1.20, respectively).

Importantly, the MANOVA also revealed the significant CFC \( \times \) Time Frame interaction effect, which parallels that obtained for the thought listings. The manipulation containing long-term positive consequences and short-term negative consequences (shown in light shade) resulted in more positive attitudes, subjective norms, perceived behavioral control, intentions, and higher threat appraisal in the form of fear of diabetes among high-CFC individuals and less positive endorsement of screening among low-CFC individuals. Conversely, the manipulation containing short-term positive consequences and long-term negative consequences (shown in dark shade) resulted in more positive endorsement of screening and greater fear of diabetes among low-CFC individuals and less positive endorsement of screening among high-CFC individuals.

### Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Low CFC (n = 108)</th>
<th>High CFC (n = 102)</th>
<th>Univariate F(1, 195)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>4.68</td>
<td>5.04</td>
<td>7.38**</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>4.57</td>
<td>5.13</td>
<td>13.98**</td>
</tr>
<tr>
<td>Perceived behavioral control</td>
<td>4.92</td>
<td>5.37</td>
<td>8.57**</td>
</tr>
<tr>
<td>Intention</td>
<td>4.39</td>
<td>5.04</td>
<td>12.91**</td>
</tr>
<tr>
<td>Negative affect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“If I am screened and no problems are found”</td>
<td>1.42</td>
<td>1.20</td>
<td>4.45*</td>
</tr>
<tr>
<td>“If I do not go for screening”</td>
<td>4.38</td>
<td>4.98</td>
<td>12.53**</td>
</tr>
<tr>
<td>“If I go for screening and diabetes is found and treated”</td>
<td>2.39</td>
<td>2.09</td>
<td>3.36</td>
</tr>
<tr>
<td>“If I develop diabetes”</td>
<td>3.78</td>
<td>4.35</td>
<td>7.38**</td>
</tr>
</tbody>
</table>

Note. High scores on measures of affect indicate high negative affect. CFC = consideration of future consequences.

* \( p < .05 \). ** \( p < .01 \).

### Mediation of Experimental Effects on Behavioral Intentions

Our final study aim concerns the mediation of the effects of the CFC \( \times \) Time Frame interaction on intention to take part in diabetes screening. Thus far, we have shown that the CFC \( \times \) Time Frame interaction influences (a) the generation of positive and negative thoughts; (b) evaluations of screening in terms of attitude, subjective norm, perceived behavioral control, and fear; and (c) intention. The interaction did not significantly influence any of the three measures of anticipated affect; therefore, we did not include these variables in the mediation analyses. We estimated a series of path analytic models to examine the mediation of the CFC \( \times \) Time Frame interaction effect on behavioral intentions. The analyses were conducted by simultaneous process, using the EQS computer program with a maximum likelihood method (Bentler, 1995). The effectiveness of the models in accounting for the covariance among the study variables was evaluated with the goodness-of-fit.

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2 As CFC was shown to be associated with amount of thought given to diabetes before the manipulations, we also conducted the \( 2 \times 2 \times 2 \) MANOVA with “thought given to diabetes” as a covariate. The analysis revealed an identical pattern of results, namely a significant main effect of CFC, \( F(8, 194) = 2.16, p < .05 \), and a significant CFC \( \times \) Time Frame interaction, \( F(8, 194) = 2.16, p < .05 \).
chi-square, which should be nonsignificant for a well-fitting model.

We first estimated a path model in which the direct and indirect effects of the main experimental manipulations—the CFC × Time Frame interaction, the TPB variables, and the measure of fear—predicted intentions. Specifically, the CFC measure and time frame manipulation in the form of contrast variables, centered to minimize the potential for multicollinearity, and the interaction term, consisting of the product of these centered variables, were set to directly affect behavioral intentions. Free parameters were also included, representing the direct effects of attitude, subjective norm, perceived behavioral control, and fear on intentions. In addition, we controlled for the main effects of the CFC measure and time frame manipulation on the TPB variables by specifying free parameters between these variables. Finally, indirect effects of the interaction term on intention were included through each of the TPB constructs and anticipated fear.

This hypothesized model exhibited excellent fit with the data, \( \chi^2(2, N = 210) = 3.72, p = .16 \). Standardized path coefficients for the model are given in Figure 3. The direct effects of attitude (\( \beta = .13, p < .05 \)), subjective norm (\( \beta = .24, p < .05 \)), perceived behavioral control (\( \beta = .50, p < .01 \)), and anticipated fear (\( \beta = .13, p < .05 \)) on intentions were significant, as expected. There were no main effects of CFC and time frame on intention, and the direct effect of the interaction term was also nonsignificant. There were also no main effects of CFC and time frame on the TPB variables. However, the direct effects of the interaction term on the TPB variables and anticipated fear were significant. The mediation of the relation between the interaction term and intention by the attitude, subjective norm, perceived behavioral control, and fear constructs was confirmed using the procedures advocated by Baron and Kenny (1986).

There are four criteria that require satisfaction for mediation to be supported:

1. The dependent variable (in this case, intention) should be

To confirm that the inclusion of the interaction term accounted for a significant increment in explained variance after controlling the main effects of CFC and time frame, we conducted a series of nested path analytic models in which the direct effect of the CFC × Time Frame interaction was fixed to zero. In each alternative model, the effect of the interaction term was fixed to zero; this resulted in a significant increase in the goodness-of-fit chi-square compared with the full model that included this path: attitude, \( \Delta \chi^2 = 11.99, p < .01 \); subjective norm, \( \Delta \chi^2 = 14.10, p < .01 \); and perceived behavioral control, \( \Delta \chi^2 = 24.83, p < .01 \); fear, \( \Delta \chi^2 = 13.34, p < .01 \). This confirmed that the effect of the interaction term on each of these constructs after the inclusion of the main effects resulted in a significant increment in the variance explained in the dependent variable.

Detailed procedures for testing mediation using path models were obtained from David A. Kenny’s Web site, http://davidakenny.net/cm/mediate.htm.
correlated with the independent or predictor variable (the interaction term of the CFC\texttimes Time Frame manipulation).

2. The mediator(s) (attitude/subjective norm/perceived behavioral control/fear) should be correlated with the independent variable.

3. The mediator(s) should have a significant unique effect on the dependent variable when included alongside the independent variable in a multivariate test of these relationships.

4. The effect of the independent variable on the dependent variable should be significantly attenuated or nullified on the inclusion of the mediator(s) as (an) independent predictor(s) of the dependent variable.

The satisfaction of Conditions 1 and 2 can be derived from the ANOVA reported previously and from the correlations shown in Table 2. The path analysis indicated that when the CFC\texttimes Time Frame interaction term is included alongside the mediators in a multivariate test predicting intention, the influence of the proposed mediators is significant in each case. Finally, to test whether each of the proposed mediating variables accounted for the shared variance between the CFC\texttimes Time Frame interaction and intention, the paths reflecting the direct relationships of the mediators were fixed to zero (i.e., dropped from the model) and the analysis was reestimated. Fixing these paths resulted in a restoration of the direct effect of CFC\texttimes Time Frame on intention. We tested the significance of the indirect effect of the interaction term on intention via the theory of planned variables using a Sobel test. This revealed a significant indirect effect ($\beta = .39$, $p < .01$), which effectively reproduces the zero-order correlation between the interaction term and intention, indicating that the mediation is complete ($z = 5.43$, $p < .01$). Sobel tests also confirmed that each of the variables—attitude ($z = 2.84$, $p < .01$), subjective norm ($z = 4.77$, $p < .01$), perceived behavioral control ($z = 10.04$, $p < .01$), and fear ($z = 3.18$, $p < .01$)—contributed independently and significantly to the mediation of intention.

A further mediation analysis was conducted to examine the role of the positive and negative thoughts generated by participants in accounting for the effects of the manipulations and CFC. We
hypothesized that the net number of positive thoughts (positive thoughts − negative thoughts) would be a mechanism through which the interaction between CFC and time frame would exert its effects on the TPB and fear constructs. Correlations between net positive thoughts and other variables are shown in Table 2. A path analytic model was estimated in which net positive thoughts was directly predicted by the CFC × Time Frame manipulation, as well as exerting direct effects on attitudes, subjective norms, perceived behavioral control, or fear. We hypothesized that the effects of the CFC × Time Frame constructs on the TPB variables and fear would be indirect via net positive thoughts. This resulted in a significant increase in the goodness-of-fit for the model when this path was added, as shown in Table 2. The interaction term on each of the TPB constructs were also estimated to confirm that the direct effect of the CFC × Time Frame interaction term was significant, it can be concluded that the interaction term accounted for a significant increase in the goodness-of-fit chi-square compared with the full model that included this path (Δχ² = 17.25, p < .01), confirming that the interaction term accounted for a significant increment in variance after controlling for the main effects.

Table 2

<table>
<thead>
<tr>
<th>Intercorrelations Among Study Variables</th>
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<tbody>
<tr>
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<tr>
<td>1. Attitude</td>
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<tr>
<td>2. Subjective norm</td>
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<td>3. Intent</td>
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<tr>
<td>4. PBC</td>
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<td>5. Fear</td>
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<tr>
<td>6. CFC</td>
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<td>7. Time frame</td>
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<tr>
<td>8. CFC × Time frame</td>
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<td>9. Net positive thoughts</td>
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Note. PBC = perceived behavioral control; CFC = consideration of future consequences. Net positive thoughts is the number of positive thoughts minus the number of negative thoughts.

*p < .05. ** p < .01.

Discussion

The goal of this experiment was to demonstrate that individual differences in the extent to which people consider the long- and short-term outcomes of their current behaviors, as assessed by CFC, have important consequences for the persuasiveness of health-related communications. High-CFC individuals held more positive attitudes, subjective norms, perceived behavioral control, and intentions to participate in Type 2 diabetes screening; were more fearful of diabetes; and anticipated more regret if they did not take part in screening. These findings support the proposition that people high in CFC are more disposed toward long-term preventive health behaviors.

The strongest test of the role of CFC is provided by the interaction of CFC with the effects of temporal framing of the outcomes of screening participation. High-CFC participants, who weigh long-term outcomes more heavily, were more persuaded when positive consequences of taking part in Type 2 diabetes screening were presented as lasting years into the future and negative consequences were presented as immediate. In contrast, low-CFC participants were more persuaded when positive consequences were presented as immediate and negative outcomes were presented as occurring years into the future. Evidence from thought listings showed that the interaction of CFC with temporal frame had an impact on the salience of information contained in the different messages. More important, when participation in screening was framed as having short-term positive consequences, low-CFC individuals produced fewer negative relative to positive thoughts than when positive consequences were presented as long term. This is an important finding because low-CFC individuals are less likely to be motivated to engage in a range of health-related behaviors. The present findings suggest that careful emphasis of the short-term consequences in a health communication might increase motivation among low-CFC individuals.

Several studies have not been able to demonstrate effects of different health-related communications on beliefs and attitudes

5 Main effects of CFC and time frame on the net positive thoughts construct were also estimated to confirm that the direct effect of the CFC × Time Frame interaction term accounted for significant incremental variance in net positive thoughts. We estimated a nested model in which the direct effects of CFC and time frame on net positive thoughts were free parameters, but the effect of the CFC × Time Frame interaction was fixed to zero. This model resulted in a significant increase in the goodness-of-fit chi-square compared with the full model that included this path (Δχ² = 17.25, p < .01), confirming that the interaction term accounted for a significant increment in variance after controlling for the main effects.
The path analysis confirmed that fear of diabetes from accounts of health-protective behavior such as protection motivation theory (Rogers, 1975) contributed to the prediction of intentions and showed that the effects of the interaction of CFC with temporal frame on attitudes, subjective norm, perceived behavioral control, and fear mediated the effect on behavioral intentions. These findings suggest it may be worthwhile to include measures of fear of disease in future research concerning health-related behaviors and underscore the importance of giving consideration not only to behavioral evaluations such as proposed by the TPB, but also to threat appraisals or “disease evaluations” in understanding health-related decision making (Orbell, in press). It is important to note that fear of diabetes is a motivational variable that is positively associated with intention in protection motivation theory, at least at moderate levels of intensity (Milne, Sheeran & Orbell, 2000).
path analyses showed that the net generation of positive thoughts induced by the CFC × Time Frame interaction was associated with higher fear of diabetes. This suggests that the presentation of the positive consequences of screening, in a manner congruent with CFC, enhanced motivation in part by activating an affective response to threat of diabetes.

The participants in the present research were selected on the basis of their age eligibility to participate in a proposed new screening program and were shown to view diabetes as relevant to themselves. Nonetheless, CFC scores were associated with the extent to which participants had given prior thought to the issue of diabetes. It is possible that prior thought about the condition and even CFC may be related to present health status, in terms of body mass index, exercise, or diet. Poor diet, for example, might be related to low CFC insofar as it reflects a lack of consideration for future consequences. Future work might usefully include measures of actual health status or investigate the impact of CFC on motivation for behavior change among those at high medical risk. In a related manner, by focusing on people of 40 years and above and by defining long-term consequences in terms of years into the future, the present study may have underestimated the potential for severe long-term consequences to influence motivational processes. It is feasible, for example, that a message emphasizing the lifetime nature of care and treatment for Type 2 diabetes might not be readily overlooked even by people with low CFC.

The present study used thought listings to examine the differential salience of communications with alternate temporal frames for people scoring high and low on CFC and demonstrated that they mediate the experimental effects on intention. This method has substantial precedent for assessing the ways in which persuasive communications might affect attitude and attitude change and have previously been used in the health domain (e.g., de Hoog, Stroebe, & de Wit, 2005; Kreuter et al., 1999; Orbell et al., 2004). However, it would be valuable to replicate the present findings using a laboratory methodology in which participants did not have access to the passage containing the manipulation while completing the thought-listing task. A further limitation of the method and a valuable domain for future research, particularly in relation to CFC, might be to distinguish between the possibilities that participants selectively do not attend to information versus actively discount information presented in a time frame that is incongruent with their typical decision-making style.

It would also be desirable to demonstrate the effects of CFC and temporal frame on actual behavior. This could not be done in the present study because screening for Type 2 diabetes has not yet been made available in the United Kingdom. Intentions are good predictors of a range of behaviors and obtained an average correlation of .53 with behavior in a recent meta-analysis (Sheeran, 2002). Specifically, intentions have been found to provide good predictions of participation in screening (e.g., Orbell & Sheeran, 1998; Rutter, 2000; Sheeran & Orbell, 2000).

In sum, individual differences in an individual’s tendency to consider either the immediate or the longer term consequences of his or her behaviors have been demonstrated to have important psychological consequences for decision making. CFC moderated the salience of information presented in different temporal frames and had substantive implications for the development of positive intentions to participate in a proposed new screening program. The findings underline the value of matching communication content to personal characteristics.

References


