EXPLORING THE EFFECTS OF SELF-AFFIRMATION ON BEHAVIOUR,

INTENTIONS AND THE PREDICTORS OF INTENTIONS RELATED TO FRUIT

AND VEGETABLE CONSUMPTION

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ABSTRACT

Objectives. The effects of self-affirmation on health-related behaviour, intentions and their predictors; the mechanisms underlying these effects (expectancies, moral norm, self-regulatory processes and reasons for behaviour); and motivational and volitional reasons for the relative failure of self-affirmation to promote behaviour (inadequate intention quality and the intention-behaviour gap) were investigated. *Methods.* In four experimental studies targeting fruit and vegetable consumption, participants reported baseline consumption and were randomly assigned to a self-affirming or non-affirming task, with Study 2 additionally including a novel self-affirming task inspired by implementation intentions. Subsequently, participants read a health message about eating fruit and vegetables. In Study 1, this was followed by the Single Category Implicit Association Test measuring implicit motivation. In all studies, participants then reported cognitions about fruit and vegetable consumption and, in Study 3 only, formed or did not form implementation intentions related to fruit and vegetable consumption. After designated follow-up periods (Studies 1, 4: 7 days; Study 2: 7 days and 1 month; Study 3: 7 days and 3 months) participants reported these cognitions again together with fruit and vegetable consumption. *Results.* It was found that self-affirmation promoted behaviour (Studies 2, 3) and expectancies (Study 3). Expectancies mediated the relationship between self-affirmation and behaviour, with behaviour benefiting from synergistic effects produced by a combination of self-affirmation and implementation intentions (Study 3). No beneficial effects of self-affirmation were identified on implicit motivation, intentions, intention predictors and properties, moral norm, self-regulatory processes or reasons. *Conclusions.* The thesis provides evidence concerning the ability of self-affirmation to promote health-related behaviour up to 3 months, with expectancies identified as an underlying mechanism behind it. This, together with a lack of evidence that the effects of self-affirmation are prone to dissolution at either the motivational or volitional stage of behaviour change, supports the potential use of self-affirmation in health interventions.

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CHAPTER ONE

This chapter lays out the practical, theoretical and empirical background to the
thesis and provides a general overview of the empirical studies. The practical
background sets the scene for the thesis from the applied perspective by highlighting the
current problem of lifestyle diseases, singling out potential health behaviour for
targeting (fruit and vegetable consumption) and outlining psychological factors that
might prevent this behaviour. The theoretical background identifies the theoretical
frameworks for the development of health interventions (Self-Affirmation Theory) and
assessing their effects (e.g., the Theory of Planned Behaviour). The empirical
background details research findings on the effects of self-affirmation on the process of
health behaviour change and other related effects. This culminates in a summary of the
most essential of these effects and an outline of open research avenues for future health-
related self-affirmation research, from which the research questions and aims of the
thesis are derived. The chapter closes with a description of the chosen methodology
(positivism) and the particulars of the analytical approach used for the studies in the
thesis.

Practical Background to Thesis

Challenges and Prospects of Combating Lifestyle Diseases

For the past few decades there has been a growing awareness of the need for
people to move towards healthier lifestyles. Indeed, according to the World Health
Statistics 2012 report of the World Health Organisation (WHO), noncommunicable

diseases, more commonly known as lifestyle diseases, pose "a major health challenge of the 21st century" (WHO, 2012, p. 34). This report shows that lifestyle diseases caused 36 million deaths worldwide in 2008, with annual deaths projected to increase by an additional 19 million by 2030. Currently, the principal cause of almost half (48%) of deaths associated with lifestyle diseases in the world is cardiovascular disease, with cancers and chronic respiratory diseases being distant runners-up (WHO, 2012). In the United Kingdom, cardiovascular disease was also the leading cause of death in England and Wales in 2009 (Office for National Statistics, 2011). While cardiovascular disease remains a major cause of death (29% of all deaths), there has been a recent decline in cardiovascular-related deaths, which is attributed to medical advances and government-endorsed campaigns promoting healthier diet and lifestyles (Office for National Statistics, 2012). That a change in lifestyle has had a tangible effect on the leading cause of death is encouraging and provides evidence that persuading people to follow health advice, helping them to translate their health aspirations into practice, and to overcome possible relapses to unhealthy habits is a worthwhile research avenue. This research avenue might be informed fruitfully by Self-Affirmation Theory (Steele, 1988), which has shown some promise in the promotion of health-related behaviour, intentions and the factors predicting intentions that warrants further investigation.

Benefits of Fruit and Vegetable Consumption for Preventing Lifestyle Diseases

One context in which the effects of self-affirmation can be addressed usefully is the promotion of fruit and vegetable consumption. This is because a diet rich in fruit and vegetables has a number of positive effects on health, such as aiding digestion and the maintenance of healthy weight, and reducing the chances of developing heart disease, stroke and some cancers (National Health Service, 2011). The benefits of fruit and vegetables on cardiovascular-related diseases are particularly notable. For example,

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consuming at least 8 portions of fruit and vegetables every day compared to less than 3 was found to be associated with a 22% reduction in the chances of developing fatal ischemic heart disease (Crowe et al., 2011). Importantly, every portion of fruit and vegetables has been shown to contribute beneficially to health. Specifically, in the study by Crowe et al. (2011), a single increment in portions led to a 4% reduction in fatal ischemic heart disease, which is in line with earlier research by Joshipura et al. (2001) on coronary heart disease. That a diet rich in fruit and vegetables is beneficial for health has been recognised by the WHO for decades, which since 1990 has recommended a daily consumption of at least 400 grams (5 portions x 80 grams) of fruit and vegetables (WHO, 2012). In accordance with this recommendation, the British government has run a long-term, high-profile 5 A DAY campaign, which promotes the consumption of at least 5 portions of fruit and vegetables every day among the general population (Department of Health, 2010a).

Trends in Fruit and Vegetable Consumption

Despite this campaign, on average, British people do not meet the recommended guideline for fruit and vegetable consumption. According to Food Statistics Pocketbooks 2011 and 2012, families purchased 30% less fruit and vegetables than the recommendation in 2009, which actually reduced further to 40% in 2010 (Department for Environment, Food and Rural Affairs, [DEFRA], 2011, 2012). The Food Statistics Pocketbooks detail that the tendency to purchase fewer fruit and vegetables has been evident since 2006, with the poorest families contributing the most to the decrease in fruit and vegetable purchases. Specifically, families on the lowest income made 20% fewer purchases of fruit and vegetables between 2007 and 2010, which amounted to only 3.2 and 2.7 portions in 2009 and 2010, respectively, (DEFRA, 2011, 2012). Predictably, the number of portions of fruit and vegetables purchased across all British

families was larger, at 4 portions per person per day, in both 2009 and 2010 (DEFRA, 2011, 2012). While 4 portions appear to closely approach the target of 5 A DAY, when wastage and inedible content are taken into account, it amounts to only 2.6 portions consumed, approximately one-half of the recommendation (DEFRA, 2011). Not surprisingly, in 2010, 73% of women, 75% of men and 80% of children did not meet the recommended guideline of consuming 5 portions of fruit and vegetables every day (DEFRA, 2012). The Food Statistics Pocketbook 2012 highlights that the downward tendency in fruit and vegetable consumption between 2007 and 2010 went hand in hand with substantial increases in the prices of food (DEFRA, 2012). Despite this fact, it should be noted that, even before the downward trend commenced in 2006, 68% of women, 72% of men and 79% of children did not meet the government recommendation (DEFRA, 2008), which raises the possibility of other contributing factors for non-adherence to the recommendation, including psychological ones.

Psychological Factors Contributing to Poor Fruit and Vegetable Consumption

To understand the psychological factors that may prevent people from following health advice on fruit and vegetable consumption, it is necessary to appreciate the logic behind health campaigns, including 5 A DAY. As a rule, such campaigns highlight a link between a particular unhealthy behaviour and negative health consequences in the hope that, among those who practise or display this behaviour, the uncongenial link will induce feelings of dissonance. Dissonance is an unpleasant feeling arising from "the existence of nonfitting relations among cognitions" (Festinger, 1957, p. 3). An example of nonfitting cognitive relations would be failing to include sufficient fruit and vegetables in a diet despite the desire to avoid cardiovascular disease and the knowledge that a diet rich in fruit and vegetables prevents it. Before the advent of Self-Affirmation Theory, it was thought that dissonance arising from such an instance could be resolved

only through eating more fruit and vegetables, rationalising behaviour (e.g., "the enjoyment I get from eating my preferred unhealthy diet outweighs the dangers of increased risks of cardiovascular disease when I am older") or denigrating information about the link between fruit and vegetable consumption and the reduced risk of developing cardiovascular disease. However, in the face of the ubiquitous 5 A DAY campaign, the opportunities to resolve dissonance through the latter two means have become limited. Yet the uptake of a diet rich in fruit and vegetables is slower than would have been predicted by the Theory of Cognitive Dissonance (Festinger, 1957). This is further complicated by the finding that resistance to health information is particularly pronounced among people who are most at risk of negative health consequences associated with unhealthy behaviours (e.g., alcohol consumption: Leffingwell, Neumann, Leedy, & Babitzke, 2007; caffeine consumption: Sherman, Nelson, & Steele, 2000, Study 1; smoking: Weinstein, 1999). To illustrate, in a study involving college students, Leffingwell et al. (2007) found that, compared to non-alcohol consuming students, those who consumed alcohol thought that alcohol consumption was a less serious problem at college, downplayed their personal health risks from alcohol consumption, and were more sceptical about the scientific validity of information linking alcohol consumption to health problems. Such defensive reactions to health information do not appear to be conducive to health behaviour change and a detailed analysis of these reactions would be informative for any technique aiming to circumvent them, including self-affirmation.

A range of psychological factors, termed defensive biases, that characterise the information processing of people encountering personally relevant threatening health information was identified by Croyle, Sun and Hart (1997). The first defensive bias is the tendency of people at risk to minimise the seriousness of negative health

consequences of health conditions or behaviours compared to those not at risk (e.g., thioamine acetylase (TAA) enzyme: Jemmott, Ditto, & Croyle, 1986; caffeine consumption: Sherman et al., 2000, Study 1; smoking: Weinstein, 1999). To illustrate, in a TAA enzyme paradigm, in which a deficiency in a fictitious TAA enzyme is described as affecting pancreatic functioning, participants assigned to the deficiency condition downplayed the severity of the threat posed by the absence of the enzyme compared to participants in the control condition (Jemmott et al., 1986). The second defensive bias is for people at risk to denigrate the validity of health information, medical screening techniques and their results compared to those not at risk (e.g., cholesterol: Croyle, Sun, & Louie, 1993; caffeine consumption: Liberman & Chaiken, 1992; alcohol consumption: Leffingwell et al., 2007). To illustrate, in an experiment linking caffeine consumption with fibrocystic disease, coffee consumers studied the health message more closely and found the threatening parts of the health message to be weaker compared to non-coffee consumers (Liberman & Chaiken, 1992). The third defensive bias is a tendency of people at risk to overestimate the proportion of the population having similar health conditions or practising similar unhealthy behaviours (e.g., cholesterol: Croyle et al., 1993; smoking: Sherman, Presson, Chassin, Corty, & Olshavsky, 1983; marijuana use: Suls, Wan, & Sanders, 1988). To illustrate, student marijuana users were found to share a belief that a larger proportion of their peers engaged in a similar behaviour when compared to the estimates made by non-marijuana users (Suls et al., 1988). The fourth defensive bias is for people at risk to have a tendency to think about the health risk as short-term (i.e., acute or cyclical), rather than long-term (i.e., chronic). To illustrate, participants in the fictitious high blood pressure group were likely to believe that their condition was acute or cyclical (Croyle, 1990). While these defensive biases have proven to be robust, Self-Affirmation Theory

provides a theoretical framework that both explains why they arise and offers a

methodological procedure for overcoming them (Aronson, Cohen, & Nail, 1999).

<div align="center">**Theoretical Background to Thesis**</div>

The Origin of Self-Affirmation Theory

The notion that feelings of dissonance can be resolved by means other than those

proposed by the Theory of Cognitive Dissonance (Festinger, 1957) came to Steele, the

author of Self-Affirmation Theory (1988), after an observation that dissonance can be

alleviated through behavioural changes contextually inconsistent with the threat. In an

experiment aimed at manipulating the level of cooperation among women valuing

cooperative behaviour, Steele (1975) found that labelling women either "uncooperative"

or "bad drivers" had similar effects on their subsequent participation in a cooperation

project. Specifically, these women cooperated to a similar degree, which exceeded the

cooperation demonstrated by women labelled either "cooperative" or those not labelled

in any way. The fact that women labelled "bad drivers" were propelled to demonstrate

helping behaviour to the same degree as those labelled "uncooperative" gave Steele the

idea that there is a degree of flexibility when resolving threats to the self. This

flexibility allowed women labelled "bad drivers" to affirm their general sense of self-

worth through cooperative behaviour. Steele formally presented the idea that threat-

behaviour consistency is not a prerequisite for resolving threats to the self in Self-

Affirmation Theory (1988).

The Principles of Self-Affirmation Theory

Self-Affirmation Theory (Steele, 1988) states that dissonance arising from

challenging one important aspect of the self-system can be resolved by bolstering

another important aspect of the self-system unrelated to the threat. The "self-system",

which "explains ourselves, and the world at large, to ourselves", holds centre stage in

the theory (Steele, 1988, p. 262). It includes the individual's roles, values, social identities, cultural and gender groups, beliefs and goals (Sherman & Cohen, 2006). Aimed at protecting the sense of self-integrity, which is conceptualised as the view of ourselves as "adaptively and morally adequate that is, as competent, good, coherent, unitary, stable, capable of free choice, capable of controlling important outcomes, and so on", the self-system is activated when the integrity of the self is questioned (Steele, 1988, p. 262). This may explain the defensive reaction of people to "self-relevant negative information" about health or "threatening health information" (Reed & Aspinwall, 1998, pp. 100-101), manifested in the display of defensive biases in the processing of such information. These biases are the product of people's tendency to believe what they want to believe to the extent that they are able to justify these beliefs (Kunda, 1990). To illustrate, Sherman and Kunda (1989, as cited in Kunda, 1990) showed that high and low caffeine consumers were motivated to disbelieve the conclusions of scientific studies linking caffeine, respectively, to the advancement or to the prevention of a serious disease. Importantly, neither group of participants entirely rejected the conclusions of the studies; instead they resorted to underrating the studies' methodological merits. According to Self-Affirmation Theory (Steele, 1988), however, the motivation to protect self-integrity in the presence of threatening information can be reduced by performing actions characterised by contextual disparity with the threatening information, as people are primarily concerned with their general sense of self-integrity. For example, after reading a 5 A DAY leaflet, a person who eats a diet poor in fruit and vegetables might invest their efforts in his or her work performance to reduce the threat to the integrity of the self. Alternatively, as performing actions might have associated costs, people can simply reflect on a personal attribute or value important to them but unrelated to the threat. Using the example above, the person might reflect on himself or

herself as a productive worker, instead of increasing his or her work efforts. When the motive to protect self-integrity is satisfied, this not only lifts the pressure to derogate the threatening information, but also leaves people more open-minded.

Open-Mindedness as a Product of Self-Affirmation

The enhanced open-mindedness following self-affirmation is the result of removing the need to denigrate uncongenial personally relevant information by bolstering self-integrity through reflecting on more congenial personally relevant thoughts (Steele, 1988). As proposed by Sherman and Cohen (2006), self-affirmation achieves this by preparing people to face threatening information through boosting coping abilities and promoting an objective frame of mind. Given that a defensive reaction to personally relevant threatening health information is common, the open-mindedness produced in the wake of self-affirmation is a prize valued in health promotion. This is because there is more likelihood that a person will be persuaded by high-quality health advice once the need to respond defensively has been lifted by the process of self-affirming. That self-affirmation demonstrates potential for removing the first obstacle in the process of health behaviour change, that is, the denigration of personally threatening health information, augurs well for its future application in real-life settings. The applied potential of self-affirmation is particularly promising in view of its postulated ability to sharpen people's susceptibility to the quality of health information, rather than encouraging them to accept any health advice (Harris & Epton, 2009). The upshot of this is that weakly argued information would be rejected and strongly argued information accepted, which is the quality of information processing sought after in today's world where informed health choices have superseded blind compliance to health advice.

Typical Features of Health-Related Self-Affirmation Research

At present, however, self-affirmation remains a laboratory technique, as asking people to reflect on their personal attributes or values in conjunction with presenting health information has an aura of artificiality that may be expected in the laboratory but appear suspect in real life. This is particularly problematic as the realisation that the affirming task might have an impact on the processing of health information was shown to negate any beneficial effects of self-affirmation (Sherman et al., 2009). Despite these challenges, research into the potential of self-affirmation as a component part of health interventions has been in progress since 1998, when the first paper on the effects of self-affirmation on health cognitions and behaviour was published (Reed & Aspinwall, 1998). The corpus of health-related self-affirmation research suggests that, typically, self-affirmation studies employ an experimental design, in which one group undertakes a self-affirmation manipulation and the other group a comparable non-affirmation manipulation before reading a health message followed by the measures of cognitive variables. To ensure that participants do not draw links between the self-affirmation part and the health message plus dependent variables part, the two parts are normally presented as two unrelated studies.

Centre stage in the self-affirmation part of the studies is the self-affirming exercise, although some measures might also be included in this part, such as potential mediators or moderators of the effects of self-affirmation. McQueen and Klein (2006) singled out characteristics of the usual self-affirmation manipulation, which ordinarily focuses on important personal values or attributes either proposed by the researcher or selected by participants. The forms that self-affirmation manipulations take are varied and they can be delivered, for example, through scale completion, essay writing, evoking images or providing positive feedback. These techniques are assumed to be

equally effective when placed either before or after the health message (McQueen &

Klein, 2006), which is a supposition based on limited evidence (e.g., Sherman et al.,

2000, Study 1). Whether one method of self-affirming is more effective than the other is

also yet to be established with confidence, as typically the effects of a single self-

affirmation manipulation, rather than a range of self-affirmation manipulations, is

compared to a non-affirmation manipulation (McQueen & Klein, 2006). Generally,

however, scale completion and essay writing have been the methods of choice in the

majority of health-related self-affirmation studies, with the placement of self-

affirmation manipulation before the health message being the preferred option (Harris &

Epton, 2009). Overall, on reviewing the methodological aspects of self-affirmation

research, McQueen and Klein (2006) suggested that the quantitative measurement and

construct validity of self-affirmation manipulations need to be addressed if self-

affirmation is to be applied in real-life settings.

The second part of self-affirmation studies consists of a health message followed

by dependent variables assessing the effect of self-affirmation on cognitions related to

the message. Health messages employed in self-affirmation research normally emulate

the format of genuine health information material and predominantly come in written

form, such as articles, leaflets and brochures, or pictorial form, such as images and

videos. Both fictitious and genuine risks have been targeted by these messages, with the

former creating purer experimental conditions for controlling the level of risk and the

latter having greater applied potential (Harris & Epton, 2009). The content of the

message has an important role to play in determining the range and nature of the

dependent variables under investigation. Typically, a self-affirmation study adopts one

of the theories of behaviour or health behaviour and tests the effect of self-affirmation

on all or some of its constructs, with some studies in addition probing novel

mechanisms whereby the effects of self-affirmation are produced and testing the conditions under which the effects of self-affirmation are most pronounced.

Self-Affirmation as a Theory-Based Health Intervention

If self-affirmation is to be taken seriously as a component part of health interventions with feasible potential for real-life application, it has to prove that it is more "evidence-based" than "evidence-inspired" (Michie & Abraham, 2004, p. 46). This is due to the fact that there has been a common tendency for psychological studies on health interventions to gravitate towards being "evidence-inspired" through a lack of specificity in the descriptions of interventions and a fuzzy link between the adopted theoretical framework and the choice of a specific intervention (Michie & Abraham, 2004). Having said that, self-affirmation has a good theoretical starting position, as not only are self-affirmation manipulations directly derived from a theory in their form and inspiration, but also the effects of self-affirmation have been typically investigated within the framework of established theories of behaviour and health behaviour. When these theories are applied to health promotion, the ultimate goal of health interventions is to produce health behaviour change. Indeed, Michie and Abraham (2004) state that, unless a health intervention can induce a measurable beneficial change in the targeted health-related behaviour in the experimental group compared to the control group, it cannot be thought satisfactory for real-life use. It follows then that health-related self-affirmation research ideally should strive to affect behaviour. Arguably, however, any effects of self-affirmation on the predictors of behaviour are also of value, as combining self-affirmation with other interventions might produce synergistic behavioural effects that would be absent if the interventions were employed separately.

The most commonly adopted behavioural theory for self-affirmation research is the Theory of Planned Behaviour (TPB; Ajzen, 1991), with Protection Motivation

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Theory (PMT; Rogers, 1983) being the second most frequently used theory. According to the TPB, behaviour is directly predicted by behavioural commands that people give to themselves in order to achieve a desired goal (i.e., intentions). Intentions in their turn are predicted by peoples' beliefs about and appraisal of the outcomes of behaviour (i.e., attitudes), their perceptions of whether significant others would like them to engage in the behaviour in conjunction with their willingness to comply (i.e., subjective norm), and their perceptions of their ability to perform the desired behaviour (i.e., perceived behavioural control). Similarly to the TPB, PMT postulates that behaviour is directly predicted by intentions, although the processes behind the formation of intentions are different. PMT distinguishes two possible routes that people might take in the face of threatening health information: protection motivation and maladaptive responses. Whichever route is taken depends on the assessment of perceived severity of and vulnerability to the threat (i.e., threat appraisal) and response efficacy and self-efficacy (i.e., coping appraisal). Perceived severity and perceived vulnerability are beliefs about the seriousness of health threat and the perceived likelihood of succumbing to the health threat, respectively. Response efficacy and self-efficacy are the perception that the recommended action will alleviate the threat and the belief that the individual can follow through with the recommendation, respectively. Engendering protection motivation (i.e., strong intentions) requires accepting the severity of health threat and personal vulnerability to it and believing that the recommended behaviour would remove the health threat and that an individual is able to enact that behaviour, otherwise maladaptive responses ensue. Protection motivation is evident in the formation of intentions to act in accordance with the health recommendation, while maladaptive responses manifest themselves in maintaining the health-threatening behaviours or the absence of the recommended behaviour.

Among other theories that have been or could potentially be applied to studying the effects of self-affirmation are: the Health Action Process Approach (HAPA; Schwarzer, 1992) and the Extended Parallel Process Model (EPPM; Witte, 1992). These theories, however, are not a total departure from the TPB and PMT. Indeed, the HAPA is an extension of the TPB in that it elaborates on the intention-behaviour relationship by postulating constructs, such as planning and self-efficacy, mediating this relationship (Sniehotta, 2007). Moreover, both the HAPA and EPPM share some common constructs with PMT. Specifically, perceived severity from PMT features as risk perception in the HAPA and susceptibility in the EPPM, response efficacy in the PMT features also in the EPPM and as outcome expectancies in HAPA, and self-efficacy is part of all three models. Having said that, it is intentions that enjoy the special status as the most proximal predictor of behaviour (Conner & Norman, 2005). That intentions are an important variable in the process of behaviour change is highlighted by the findings that they account for 27% of variance in behaviour in the corpus of TPB studies (Armitage & Conner, 2001) and for 16% of variance in the corpus of PMT studies (Milne, Sheeran, & Orbell, 2000). A medium-to-large increase in intentions was shown to produce a small-to-medium behavioural change (Webb & Sheeran, 2006). Arguably, alongside behaviour, this makes intentions and their predictors central to any research probing self-affirmation as a component part of a health intervention and pivotal to the current thesis.

Empirical Background to Thesis

Organisation of the Review of Empirical Health-Related Self-Affirmation Literature

According to Michie and Abraham (2004), the assessment of the success of health interventions can be carried out by answering in a hierarchical order the

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following questions: "Do they work?", "How well do they work?" and "How do they work?" (pp. 29-30). Given that self-affirmation is a relatively new health intervention technique, the emphasis in the review of empirical literature below is on the first question in the hierarchy, specifically "Does self-affirmation work?". Conducted as a research synthesis, the literature review focuses primarily on an in-depth examination of the effects of self-affirmation in the presence of a health message on health-related behaviours, intentions and the predictors of intentions.[1] In addition, the mediators and moderators of these effects, as well as the effects of self-affirmation on health message acceptance, affect, information processing and a variety of constructs outside the TPB and PMT are also examined, as the exhaustive coverage of published self-affirmation literature on the process of health-behaviour change was aspired to.[2] The structure of the literature review was built conceptually around the constructs in the process of health behaviour change proposed by the TPB, the most often used theory of behaviour in self-affirmation research. The conclusions drawn from the review were used as a starting point for developing research questions for the current thesis. In all of this, a neutral perspective on the effects of self-affirmation on health-related cognition and behaviour was adopted, meaning that the literature review was intended to be unbiased in presenting research findings.

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[1] Typically, self-affirmation manipulations are presented in conjunction with a relevant health message. Therefore, the effects of self-affirmation on the dependent variables should be qualified by the fact that they occur "in the presence of a health message". However, given that the health message is presented to the experimental and control groups (i.e., is controlled for), for the purposes of brevity, it is assumed this point is understood and it is not normally reiterated throughout the thesis.

[2] Research papers that examined the direct effect of self-affirmation on health and stress (e.g., on the salivary cortisol level in the paper by Creswell et al., 2005) did not form part of the literature review due to their tangential nature to the cognitive processes involved in health behaviour change.

Search Parameters and Sample of Studies for the Review of Empirical Health-Related Self-Affirmation Literature

The list of research papers was obtained by carrying out a search in the Web of Knowledge, an Internet-based computerised database of scientific literature. To make sure that all the relevant papers were identified, the search was conducted on research literature available from the conception of Self-Affirmation Theory in 1988 to the end of the year 2009, at which point the experimental work on the thesis began. The computerised literature search was not limited to the health domain, so a topic query was carried out with the broad search term "self-affirm*" to ensure that no relevant papers were unintentionally left out. Two hundred and ninety-six hits were returned by the Web of Knowledge, which were then reduced to 15 relevant papers (containing 21 studies, with 16 relating to health) by assessing the research abstracts and, where necessary, the full paper content for relevance to the topic of self-affirmation and health behaviour. See Table 1 for the sample of studies identified, together with the description of the targeted behaviour, the number of participants and the nature of dependent variables in each study.

Table 1.

The Sample of Health-Related Studies for the Review of Empirical Self-Affirmation Literature

Reference	Targeted Behaviour	N	Dependent Variables			
			Behaviour[a]	Intentions[b]	Predictors of Intentions	Other
Armitage, Harris, Hepton, & Napper (2008)	Smoking	57	✓	✓	✓	✓
Crocker, Niiya, & Mischkowski (2008)	Smoking	102				✓
Dillard, McCaul, & Magnan (2005)	Smoking	130		✓	✓	✓
Epton & Harris (2008)	Fruit and vegetable consumption	93	✓	✓	✓	
Fry & Prentice-Dunn (2005)	Breast self-examinations	202		✓		
Harris, Mayle, Mabbott, & Napper (2007)	Smoking	87	✓	✓	✓	✓
Harris & Napper (2005)	Alcohol consumption	82	✓	✓	✓	✓
Jessop, Simmonds, & Sparks (2009)	Sunscreen use	162	✓	✓	✓	✓
Klein & Harris (2009)	Alcohol consumption	118				✓
van Koningsbruggen & Das (2009)	Type 2 diabetes	84	✓	✓		✓
van Koningsbruggen, Das, & Roskos-Ewoldsen (2009)	Caffeine consumption	84		✓		✓
Napper, Harris, & Epton (2009)	Alcohol consumption	35		✓	✓	✓
Reed & Aspinwall (1998)	Caffeine consumption	66	✓	✓	✓	✓
Sherman et al. (2009)	A range of health behaviours	83				✓
Sherman, Nelson, & Steele (2000)[c]						
Study 1	Caffeine consumption	60		✓		✓
Study 2	AIDS	61	✓			✓

Note. [a]Including preparatory and actual behaviour. [b]Including constructs closely related to (e.g., plans) and contrasting with (e.g., avoidance) intentions. [c]The paper included two health-related studies.

The Effects of Self-Affirmation on Health-Related Behaviour

One of the first indications that self-affirmation might have the potential to affect actual health-related behaviour came from studies in which self-affirmation promoted preparatory health-related behaviours. In some of these studies, the whole group or an at-risk sub-group of self-affirmed participants more readily sought information related to the targeted health behaviour compared to non-affirmed participants. Specifically, Sherman et al. (2000, Study 2) and Armitage, Harris, Hepton and Napper (2008) found that self-affirmed participants took more brochures about AIDS and leaflets on smoking cessation, respectively, compared to their non-affirmed counterparts. Van Koningsbruggen and Das (2009) found that self-affirmed at-risk participants were more likely to follow an online link to a screening test for type 2 diabetes than were non-affirmed participants. In addition to these findings, self-affirmed participants were found to be more willing to take pre-emptive health-related safeguards. Specifically, Sherman et al. (2000, Study 2) and Jessop, Simmonds and Sparks (2009) found, respectively, that self-affirmed participants bought more condoms at the end of an AIDS-related video and accepted more free samples of sunscreen, albeit in the latter study only in the positive traits self-affirmation manipulation condition.

While encouraging, these preparatory behaviours are some way away from the actual changes in health behaviour that Michie and Abraham (2004) consider to be the ultimate indicator of the success of health interventions. Having said that, studies demonstrating preparatory health-related behaviours gave the researchers confidence to pursue this aspect of self-affirmation, with Epton and Harris (2008) finding a measurable change in fruit and vegetable consumption (around 1 additional portion a day) of self-affirmed participants compared to that of non-affirmed participants after 7 days. At the time, this finding, however, was more of an exception than a rule, as in the

other studies assessing the effect of self-affirmation on a range of actual health-related behaviours no beneficial effects of self-affirmation were observed. In particular, other studies did not find an effect of self-affirmation on caffeine consumption after 7 days (Reed & Aspinwall, 1998), alcohol consumption after 1 month (Harris & Napper, 2005), or smoking cessation after 7 days (Harris, Mayle, Mabbott, & Napper, 2007).

The Effects of Self-Affirmation on Health-Related Intentions

The vast majority of studies that investigated the effects of self-affirmation on health-related intentions found beneficial effects of self-affirmation on the intentions of at-risk self-affirmed participants. In particular, self-affirmation was found to affect positively the health-related intentions of such participants to reduce caffeine consumption (Sherman et al., 2000, Study 1; van Koningsbruggen, Das, & Roskos-Ewoldsen, 2009), reduce alcohol consumption (Harris & Napper, 2005), quit smoking (Armitage et al., 2008; Harris et al., 2007), undergo type 2 diabetes screening (van Koningsbruggen & Das, 2009) and use sun-screen (Jessop et al., 2009). Having said that, some other effects of self-affirmation, ranging from null effects to the weakening of health-related intentions of self-affirmed participants, were also reported. Specifically, Fry and Prentice-Dunn (2005) and Epton and Harris (2008) found that the difference in intentions of self-affirmed and non-affirmed participants to perform breast self-examinations and to consume 5 portions of fruit and vegetables a day, respectively, was non-significant. Furthermore, Reed and Aspinwall (1998) found a negative effect of self-affirmation on the intentions to reduce caffeine consumption among at-risk self-affirmed participants. Despite these few inconsistencies, the beneficial effects of self-affirmation on health-related intentions were interpreted by Harris and Epton (2009) as one of the better supported effects of self-affirmation.

As self-affirmation has been researched from different theoretical perspectives, some variables closely related to or contrasting with intentions have been also investigated. Specifically, Fry and Prentice-Dunn (2005) found that, compared to their non-affirmed counterparts, self-affirmed participants without previous vicarious experience of breast cancer showed less evidence of avoidant thinking and hopelessness regarding the health threat, which are maladaptive coping responses in the PMT. In the PMT such maladaptive coping responses conflict with adaptive coping responses in the process of intention formation. The findings on avoidance of Fry and Prentice-Dunn (2005) were later extended by Napper, Harris and Epton (2009) who found an increased tendency to reflect on threatening breast cancer information among self-affirmed female participants without accounting for previous experience. However, the positive effects of self-affirmation on variables related to intentions have not always been demonstrated. In particular, in contrast to the above positive effects of self-affirmation on thinking about threatening health information, Jessop et al. (2009) found no effect of self-affirmation on the willingness to think about skin cancer. Further, Dillard, McCaul and Magnan (2005) and Harris et al. (2007) found no evidence that self-affirmation had an effect on motivation or plans to stop smoking. Therefore, the effects of self-affirmation on variables closely linked to health-related intentions appear to be mixed.

The Effects of Self-Affirmation on the Predictors of Health-Related Intentions

Recognising that the predictors of intentions play an important role in the variability of intentions, researchers have probed the effects of self-affirmation on the predictors of intentions from the TPB and PMT. It was found that the effects of self-affirmation on the TPB predictors of intentions are far from clear and robust. The effects of self-affirmation on attitudes were investigated in two studies, which suggested that self-affirmation might or might not affect attitudes. Specifically, Jessop et al.

(2009) found a beneficial effect of self-affirmation on attitudes to using sun-screen, while Harris and Napper (2005, as cited in Harris & Epton, 2009) found no such effects in relation to alcohol consumption. Subjective norm was assessed only in one self-affirmation study, with no changes induced by a self-affirmation manipulation found (Harris & Napper, 2005, as cited in Harris & Epton, 2009). The findings of the effect of self-affirmation on perceived behavioural control are also mixed, with two studies reporting an increase in control over smoking cessation (Harris et al., 2007) and caffeine consumption (Reed & Aspinwall, 1998), but one study finding no change in control over alcohol consumption (Harris & Napper, 2005, as cited in Harris & Epton, 2009).

There has, however, been more consistency among the findings of studies probing the effects of self-affirmation on some predictor variables from the PMT, although with occasional exceptions. One such finding is the effect of self-affirmation on self-efficacy, ratings of which were promoted by self-affirming before messages about fruit and vegetable consumption (Epton & Harris, 2008) and sun-screen use (Jessop et al., 2009). The effect of self-affirmation on the feelings of self-efficacy in relation to smoking cessation is mixed, with one study finding a beneficial effect (Harris et al., 2007) and the other a null effect (Armitage et al., 2008). Self-affirmation was also successful in promoting response efficacy, the feelings of which were boosted in relation to fruit and vegetable consumption (Epton & Harris, 2008) and sun-screen use (Jessop et al., 2009). Perceived severity of the health threat was found to be unaffected by a self-affirmation manipulation in the context of smoking (Dillard et al., 2005) and alcohol consumption (Napper et al., 2009). In sum, the effects of self-affirmation on the predictors of intentions require more research attention before any definitive conclusions can be made, although self-efficacy and response efficacy have shown some promise as the key variables positively affected by self-affirmation.

Mediators of the Effects of Self-Affirmation on Health-Related Behaviour and Intentions

Knowledge about the mechanisms underlying the beneficial effects of self-affirmation on health-related behaviour and intentions will facilitate the design of interventions targeting these particular mechanisms and, thus, increase the chances of reproducing these effects. A few studies that have researched these mechanisms found that the beneficial effects of self-affirmation on behaviour and intentions might not be direct, but occur through some mediating variables. As regards health-related behaviour, Epton and Harris (2008) found that a positive change in fruit and vegetable consumption by self-affirmed participants was mediated by response efficacy; self-efficacy was also boosted by self-affirming but did not emerge as a significant mediator. Jessop et al. (2009), who found a beneficial effect of self-affirming on taking sun-screen samples among participants in the positive traits self-affirmation manipulation condition, did not find that this behaviour was mediated by acceptance of or defensiveness to the health message. Having said that, Armitage et al. (2008) and van Koningsbruggen and Das (2009) found that message acceptance and message derogation mediated the effect of self-affirmation on intentions to stop smoking and to undergo a screening test for type 2 diabetes. Moreover, intentions in these studies mediated the relationship between message acceptance and behaviour and between self-affirmation and behaviour, respectively. No mediating effect was found for risk perceptions on the relationship between self-affirmation and intentions to reduce alcohol consumption (Harris & Napper, 2005) or reaction times to threat-related words or perceived message quality on the relationship between self-affirmation and intentions to reduce caffeine consumption (van Koningsbruggen et al., 2009). Overall, the mechanisms through which self-affirmation produces beneficial effects on health-

related behaviour and intentions remain unclear, which is partly due to a small corpus of studies that identified the significant effects of self-affirmation on intentions and behaviour, one of the prerequisites for analysis of mediation.

Moderators of the Effects of Self-Affirmation on Health-Related Behaviour, Intentions and the Predictors of Intentions

It is important for any potential health intervention to establish whether the effects it produces are observed under all or particular circumstances. Tailored interventions take such moderating circumstances into account, but by their nature are more challenging to develop. The applicability of self-affirmation alongside health messages to as wide as possible a range of circumstances is desirable, but there have already been signs that the effectiveness of self-affirmation may be subject to the participant level of risk, although only on some constructs in the models of behaviour. As regards health-related behaviour, Jessop et al. (2009) found no moderating effect of participant risk level on the relationship between self-affirmation and the acceptance of samples of sun-screen. As regards health-related intentions, the moderation of the relationship between self-affirmation and intentions by level of risk was found on alcohol consumption (Harris & Napper, 2005), smoking cessation (Armitage et al., 2008; Harris et al., 2007) and type 2 diabetes screening (van Koningsbruggen & Das, 2009), with those at higher risk benefiting the most from self-affirmation. Having said that, Epton and Harris (2008) found no moderating effects of the level of risk on the relationship between self-affirmation and intentions in the context of fruit and vegetable consumption. Moreover, van Koningsbruggen and Das (2009) observed that those at low risk demonstrated decreased intentions to undergo online screening for type 2 diabetes, which is acceptable provided that the low risk is real rather than assumed.

As regards the predictors of health-related intentions, several studies that looked at the moderating effects of the level of risk on the relationship between self-affirmation and the predictors of intentions found either null effects or negative effects among participants at low risk. For example, Epton and Harris (2008) found no moderating effects of the level of risk on the relationship between self-affirmation and response efficacy or self-efficacy in the context of fruit and vegetable consumption. More importantly, however, Harris and Napper (2005) found reduced perceptions of vulnerability to several health risks that had not been addressed in the focal health message (about the link between alcohol consumption and breast cancer) in participants consuming low levels of alcohol. Overall, while the findings that the effects of self-affirmation on health-related intentions are moderated by the level of risk limit the applicability of self-affirmation, they will ensure that interventions involving self-affirmation are not applied indiscriminately. As a result, any potential beneficial effects on the receivers of such interventions will be maximised and any detrimental ones will be avoided.

The Effects of Self-Affirmation on Health Message Acceptance and Affect

The acceptance of information in a threatening health message is a prerequisite for the process of health behaviour change to commence. The general and/or personal acceptance of a threatening health message (i.e., "agreeing a hazard exists" and/or "accepting it is personally relevant", Harris & Epton, 2009, p. 966) were shown to increase after self-affirming in the context of caffeine consumption (general: Sherman et al., 2000, Study 1; van Koningsbruggen et al., 2009; personal: Sherman et al., 2000, Study 1), alcohol consumption (personal: Harris & Napper, 2005) and smoking cessation (general: Armitage et al., 2008; Crocker et al., 2008). In addition, self-affirmation was found to decrease the denigration of threatening health information

among at-risk participants in the context of type 2 diabetes screening (van Koningsbruggen & Das, 2009) and sunscreen use (marginally significant effect, $p < .09$, Jessop et al., 2009), promote stronger feelings of the personal relevance of the health risk in the context of practising safer sex (Sherman et al., 2000, Study 2), alcohol consumption (Harris & Napper 2005) and smoking cessation (Harris et al., 2007), and attenuate a tendency to see personal risk as lower than that of the average peer (Napper et al., 2009; Sherman et al., 2009). Having said that, there are a few exceptions to these trends, with null effects of self-affirmation on the general acceptance of threatening health information about smoking and alcohol consumption observed by Dillard et al. (2005) and Harris and Napper (2005). In sum, however, self-affirmation appears to lead to greater general and personal acceptance of threatening health messages and to the attenuation of a tendency to denigrate them.

Alongside the acceptance of threatening health messages, researchers have probed whether boosts to one's feelings of integrity postulated by Self-Affirmation Theory would lead to enhanced positive self-related and other-related affect. As regards positive self-related affect, it was found to increase before the exposure to a threatening health message in the context of caffeine consumption (Sherman et al., 2000, Study 1). The positive self-related affect engendered by self-affirming was then found to decrease after the exposure to a threatening health message, with at-risk self-affirmed participants having been shown to experience more negative affect than non-affirmed participants in the context of alcohol consumption (Harris & Napper, 2005), smoking cessation (Harris et al., 2007) and sunscreen use (Jessop et al., 2009). The upshot of this is that self-affirmed participants show fewer of the maladaptive responses postulated by PMT to hinder behaviour change and greater protection motivation. As regards positive other-

related affect, it was also shown to increase after self-affirmation in the context of smoking cessation (Crocker et al., 2008).

Boosted positive other-related affect, as opposed to positive affect (or mood), after an act of self-affirming has become one of the alternative explanations for the processes behind the effects of self-affirmation on health message acceptance put forward in more recent self-affirmation literature. While positive mood better follows from the premises of Self-Affirmation Theory, which postulates that self-affirmation boosts self-integrity, positive mood was shown to be unaffected by self-affirmation in the context of caffeine consumption (Sherman et al., 2000, Study 1) and alcohol consumption (Harris & Napper, 2005). In contrast, the findings by Crocker et al. (2008) led these researchers to postulate that self-affirmation helps people transcend themselves, instead of concentrating on themselves. This claim was given further weight by the demonstration of a mediating effect of the feelings of love and connectedness on the relationship between self-affirmation and message acceptance (Crocker et al., 2008). Several conditions under which the effects of self-affirmation on health message acceptance, its related variables and affect are most pronounced have also been identified, most notably the level of risk. To illustrate, heavier smokers more readily accepted a health message about the dangers of smoking and its personal relevance compared to lighter smokers (Harris et al., 2007; Armitage et al., 2008); and heavier alcohol female consumers reported more negative affect while reading a health message linking alcohol consumption above the recommended limits to breast cancer, greater feelings of personal risk to succumbing to this disease and could more easily imagine themselves as breast cancer sufferers compared to lighter alcohol female consumers (Harris & Napper, 2005). In short, substantial evidence has accumulated

that self-affirmed participants show greater acceptance of threatening health information and some evidence that this might be enabled by enhanced other-related affect.

The Effects of Self-Affirmation on Health Message Processing

Given that the content of a health message is central to the effects of self-affirmation on health-related behaviour, intentions and the predictors of intentions, the account of the effects of self-affirmation would not be complete without mentioning its impact on health message processing. While spending similar amounts of time as, or even less time than, non-affirmed participants on reading a health message (Dillard et al., 2005; Reed & Aspinwall, 1998), at-risk self-affirmed participants were found to orient quicker to the threatening information in a health message (Reed & Aspinwall, 1998) and to show greater attentional bias to and cognitive accessibility of the threatening words from the health message (Klein & Harris, 2009; van Koningsbruggen et al., 2009). Of note, the above effects in Klein and Harris's (2009) study were most pronounced among participants at moderate rather than higher risk, which gives weight to the idea of van Koningsbruggen (2009, as cited in Harris & Epton, 2009) that self-affirmation is most effective when combined with a moderately threatening health message. Further, no differences in the positivity of thoughts of self-affirmed and non-affirmed participants after exposure to the threatening health message were identified (Napper et al., 2009; Sherman et al., 2000, Study 1). However, the findings concerning the recall of a health message are mixed. Specifically, Reed and Aspinwall (1998) found a reduced tendency to remember risk-disconfirming information in a health message among self-affirmed compared to non-affirmed participants after 7 days, but Dillard et al. (2005) did not find any differences in recall tendencies immediately post intervention. Overall, while some particularities of health information processing

among self-affirmed participants have emerged, most require replication alongside the investigation of novel information processing effects of self-affirmation.

Essential Empirical Findings on and Open Research Avenues for the Health-Related Effects of Self-Affirmation

Summary of the Effects of Self-Affirmation on the Process of Health Behaviour Change

By the end of the year 2009, the corpus of health-related self-affirmation studies had produced a range of interesting theoretical findings, some with the promise of practical application. From the practical point of view, one of the most significant was the demonstration of actual health behaviour change in the context of fruit and vegetable consumption by Epton and Harris (2008). Although there were earlier demonstrations of preparatory health behaviours following self-affirmation (e.g., Sherman et al., 2000, Study 2), Epton and Harris's (2008) study was the first and then only to demonstrate actual health behaviour change in self-affirmed participants since the first self-affirmation study on health (Reed & Aspinwall, 1988). Indeed, while other studies demonstrated the capacity of self-affirmation to promote intentions to embrace health behaviour change (e.g., van Koningsbruggen & Das, 2009), none of them had found that the greater intentions of self-affirmed participants translated into actual health behaviour (e.g., Harris & Napper, 2005). In addition, although some effects on the predictors of intentions were identified (e.g., on self-efficacy in Jessop et al.'s, 2009, study), generally no robust findings had emerged for any predictor. Consequently, the mediating mechanisms behind the effects of self-affirmation on health-related intentions remained unclear, as one of the prerequisites for running a mediation analysis, namely the demonstration of the effect of the predictor (self-affirmation) on the mediator(s) (the predictors of intentions) was generally not met. On a more positive side, those effects

on health-related intentions that were found, as a rule, were most pronounced among at-risk participants, an audience notoriously difficult to persuade (e.g., Armitage et al., 2008). Taken as a whole, the above findings raised an important practical question over why most health-related self-affirmation studies had failed to find health behaviour change in self-affirmed participants despite their boosted intentions.

One way to investigate this question would be to adopt Schwarzer's (1992) position on the process of health behaviour change, which suggests that this process can be conceptually subdivided into two stages – motivational (i.e., the stage of intention formation) and volitional (i.e., the stage of translating intentions into actions) – and to consider any potential problems within them. As regards motivational problems, in view of the general consensus that self-affirmation promotes health-related intentions, Harris and Epton (2010) proposed that one of the reasons for the limited success of self-affirmation in producing health behaviour change might lie in the inadequate quality of intentions formed following self-affirmation. Specifically, they speculated that such intentions might not be genuine. One method to assess the genuineness of intentions would be to examine alongside their usual properties, such as direction and intensity, some additional ones, such as temporal stability, accessibility and certainty. Cooke and Sheeran (2013) define the temporal stability of intentions as "the consistency of intention scores over time", accessibility as "the strength of the association between mental representations of decisions and behaviour", and certainty as "people's confidence about the finality of their decision" (p. 750). Given that the temporal stability of intentions augers well for their translation into behaviour (Conner & Godin, 2007; Webb & Sheeran, 2006), self-affirmation research has already touched upon this property of intentions (Harris et al., 2007), but the other additional properties remain unexplored.

Further, the effect of self-affirmation on constructs closely related to intentions, such as behavioural expectancies and implicit motivation, should also be assessed. Expectancies (also known as expectations) denote "the individual's self-prediction of his or her future behaviour" and have been postulated to better predict behaviour compared to intentions due to the former being more constrained by feasibility considerations than the latter (Warshaw & Davis, 1985, p. 213). Implicit motivation has recently emerged as a predictor of health behaviour similar in power to intentions (Sheeran, Gollwitzer, & Bargh, 2013). It forms an integral part of dual-process models of health behaviour in which impulsive (i.e., implicit or association-based) and reflective (i.e., explicit or reasoning-based) types of information processing guide behaviour when activated to a certain degree (Hofmann, Friese, & Wiers, 2008; Sheeran et al., 2013). Sheeran et al. (2013) suggested that a synergistic effect of implicit and explicit processes on health behaviour might be observed when they work in a similar direction. It follows that supplementing health interventions based on self-affirmation with techniques used to manipulate implicit motivation might lead to a beneficial interactive effect between implicit motivation and intentions, thus enhancing chances of the enactment of the target health-related behaviour.

Finally, it would be informative to explore in a systematic way the effect of self-affirmation on the usual TPB and PMT predictors of intentions and to examine any mediating effect on the relationship between self-affirmation and intentions (Harris & Epton, 2010). Having said that, Harris and Epton (2010) proposed the TPB as the default theoretical framework for self-affirmation research forthcoming in the near future. Arguably, however, in view of a relative lack of robust effects of self-affirmation on the usual predictors of behaviour so far, it would also be informative to research the effects of self-affirmation on some less common predictors of intention and

behaviour. On the theoretical level, this can be achieved by employing a two-component TPB (Conner & Sparks, 2005), which breaks down each predictor of intentions into two finer variables, or Behavioural Reasoning Theory (BRT; Westaby, 2005), which extends the classic TPB with reasons given for and against behaviour, instead of the classic TPB. On the individual variable level, this can be achieved by the inclusion alongside the TPB predictors of some variables that have shown promise in predicting intentions, such as moral norm denoting "the perceived moral correctness of a behaviour" (Godin, Conner, & Sheeran, 2005, p. 497).

As regards volitional problems linked to the relative failure of self-affirmation to produce actual health behaviour change, Harris and Epton (2010) proposed that intentions formed following self-affirmation might fall prey to "the intention-behaviour gap" (Sheeran, Milne, Webb, & Gollwitzer, 2005). This might happen even if these intentions are genuine, as Sheeran (2002) found that 47% of people fail to translate their intentions into actions. One of the reasons for the broken line between intentions and behaviour is insufficient elaboration on intentions, which manifests itself in poor specification of the context and behaviours necessary to attain a health-related goal (Sheeran et al., 2005). Intention elaboration should ideally be performed in addition to the provision of advice on how to change behaviour in a health message. This can be achieved by supplementing a combination of a self-affirmation manipulation and a health message with a volitional intervention, such as implementation intentions, which are specific "if-then" plans on how to act in particular critical situations (Gollwitzer, 1993).

Forming implementation intentions would be especially useful for changing health-related behaviours that are deeply ingrained in peoples' lives, as to change such behaviours would require sustained goal striving in the face of physiological needs,

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personal habits and social pressure. Indeed, Harris and Epton (2010) suggested that one of the reasons for the relative failure of self-affirmation studies to engender health behaviour change might lie in the types of behaviours that were normally targeted, such as caffeine, alcohol and nicotine consumption, none of which can be easily changed. In view of this, it would be informative to test the effects of a combination of self-affirmation, a health message and implementation intentions on health-related behaviours, intentions and the predictors of intentions. To begin with, however, the uptake of health-related behaviours (e.g., fruit and vegetable consumption), rather than their termination (e.g., smoking cessation) should be targeted, which will provide more favourable conditions for health behaviour change to happen. Moreover, several follow-up periods, including prolonged ones, would further increase the chances of detecting any behavioural effects, since people might fall prey to difficulties at the initial stages, but then learn to manage them. In addition, examining self-regulatory processes during the volitional stage of health behaviour change, such as action control, conceptualised as maintaining the awareness of standards, engaging in effort to achieve these standards, and monitoring goal progress (Sniehotta, Nagy, Scholz, & Schwarzer, 2006) and perceived self-regulatory success, conceptualised as the ability to adequately assess one's success in achieving a goal (Fishbach, Friedman, & Kruglanski, 2003), could provide insights into the volitional mechanisms at work.

Summary of the Effects of Self-Affirmation on Health Message Acceptance, Affect and Health Message Processing

While the effects of self-affirmation on the constructs from the models of behaviour and health behaviour require more research attention, there has been consensus that self-affirmation leads to greater general (e.g., van Koningsbruggen et al., 2009) and personal (e.g., Sherman et al., 2000, Study 1) health message acceptance

among at-risk participants (Harris & Epton, 2009). The research on affect suggested that affect tends to become more positive towards oneself (Sherman et al., 2000, Study 1) and others (Crocker et al., 2008) immediately after self-affirmation, but to decrease after exposure to a health message (e.g., Harris & Napper, 2005), rendering self-affirmed participants more inclined towards embracing protection motivation responses to a health threat compared to non-affirmed participants. Moreover, some evidence has emerged that self-affirmed participants more readily accept threatening information than non-affirmed participants, as manifested in their quicker navigation to threatening parts of the health message (Reed & Aspinwall, 1998) and the greater accessibility of threatening words from the message (e.g., Klein & Harris, 2009). Having said that, the studies on the effects of self-affirmation on affect and health message processing are few and their assessment with implicit measures is a research area awaiting attention (Harris & Epton, 2010). Furthermore, the mechanisms underlying the effects of self-affirmation on health message acceptance, affect and health message processing remain unclear, as some obvious mediators derived from Self-Affirmation Theory, such as positive self-related affect (e.g., Harris & Napper, 2005), have been shown to remain unaffected by self-affirmation. In the face of this, several theoretical speculations on the mechanisms at work have been put forward, such as positive other-related affect, confidence and self-certainty (Harris & Epton, 2010), but the only one of them that has been supported by empirical evidence is positive other-related affect (Crocker et al., 2008), though this latter finding also requires replication. The unclear situation with regard to the mechanisms underlying the effects of self-affirmation on health message acceptance, affect and health message processing is understandable, as to suggest a new mechanism would be synonymous with reconceptualising at least some of the basic principles of Self-Affirmation Theory.

General Limitations of Health-Related Self-Affirmation Research

Taken as a whole, health-related self-affirmation research is subject to two general types of limitations, those related to the characteristics of typical participants and of self-affirmation intervention materials. The limitations linked to the characteristics of typical participants stem from the fact that participants in self-affirmation research have been predominantly female students in tertiary education, although there have been exceptions (e.g., Jessop et al., 2009). Harris and Epton (2009) identified several characteristics of this typical sample, namely gender, health risk and education, which has led to the limited generalisability of the existing body of research. As regards gender, some evidence has emerged that the effects of self-affirmation might be most pronounced among women (e.g., Sherman et al., 2000, Study 2), which should be taken into account, since both genders are in need of help to change health-related behaviours. As regards health risk, the average age of the student population is considerably younger than that of the general population, the upshot of which is that the risk of developing chronic diseases of lifestyle might not be perceived by the former as being as threatening as by the latter. This is important in view of some findings that self-affirmation may be effective only at moderate levels of threat (e.g., Klein & Harris, 2009) and the suggestion that too high a level of threat might actually be counterproductive (van Koningsbruggen, 2009, as cited in Harris & Epton, 2009), which might happen if the level of threat is gauged on the basis of the young people's responses to health messages. As regards education, people in tertiary education might be more responsive to health information, having greater appreciation of the importance of healthy lifestyle and the significance of medical research due to richer educational background.

The limitations of self-affirmation research linked to the characteristics of self-

affirmation intervention materials stem from the features of both self-affirmation manipulations and health messages. With regards to self-affirmation manipulations, methods of self-affirming such as essay writing might not be appropriate for the general population and easier alternatives (e.g., a structured self-affirmation manipulation, Sherman et al., 2009) would be welcome. Preferably, a self-affirmation manipulation should be incorporated into a health message (e.g., Jessop et al., 2009), which will allow dispensing with convoluted cover stories that might suggest to participants the purpose of the self-affirmation manipulation and in the process negate its positive effects (Sherman et al., 2009). However, elegantly merging a self-affirmation manipulation and a health message might not be an easy task and an acceptable alternative at this stage would be to use simpler verbal or mostly pictorial health messages. Such more advanced self-affirmation interventions will not only be easier to administer in experimental settings, but will also be more suitable for potential mass distribution (e.g., by means of the Internet). Overall, it is understandable that to address the above general limitations of the self-affirmation research within the framework of a single research project would be unrealistic, but incorporating some improvements would not only be desirable, but essential for increasing the chances of self-affirmation health interventions to be applied in real-life settings.

Thesis Overview

Research Questions

Given the focus of the present thesis on the effects of self-affirmation on the process of health behaviour change, I pursued some of the research avenues on the effects of self-affirmation on health-related behaviour, intentions and the predictors of intentions, while addressing some of the general limitations of health-related self-affirmation studies, as discussed above. Four research questions were addressed: (1)

Does self-affirmation have an effect on implicit motivation to change health-related behaviour? (2) Do intentions to change health-related behaviour formed following self-affirmation have characteristics of genuine intentions? (3) Is a combination of self-affirmation and a volitional intervention effective in helping people to translate their intentions to change health-related behaviour into actual health-related behaviour? (4) Does self-affirmation have an effect on health-related cognitions not accounted for by the classic TPB? To investigate the above research questions, fruit and vegetable consumption was chosen as the target health-related behaviour. This choice was made, primarily, in view of the importance of fruit and vegetable consumption for health and, secondarily, in order to replicate the success of Epton and Harris (2008) in promoting the uptake of actual health-related behaviour and to build on it by employing simpler self-affirmation methods and longer follow-up periods.

Research Aims

One general research aim that runs through each of the four studies in the thesis was derived from the research questions: to investigate whether adding a self-affirmation manipulation to a health message would affect behaviour, intentions and the predictors of intentions related to fruit and vegetable consumption compared to a health message alone. In addition to this general aim, each study pursued some specific central and peripheral aims. Among the central specific aims were: (1) to investigate the effect of adding a self-affirmation manipulation to a health message on implicit motivation to consume fruit and vegetables (Study 1), (2) to investigate whether self-affirmation has a beneficial effect on the temporal stability and certainty of intentions to consume fruit and vegetables (Study 2), (3) to investigate whether a combination of self-affirmation, a health message and implementation intentions is more effective in promoting behaviour, intentions and the predictors of intentions related to fruit and vegetable consumption

compared to a combination of self-affirmation and a health message (Study 3), (4) to investigate whether a combination of self-affirmation and a health message has an effect on reasons for and against given in relation to fruit and vegetable consumption (Study 4). Among the peripheral specific aims were to investigate the effect of self-affirmation on (1) expectancies (Study 1-4), (2) moral norm (Study 2, 4), and (3) self-regulatory processes (Study 1-4).

Methodology

The body of research described in the review of empirical self-affirmation literature suggests that the preferred methodological approach for self-affirmation in social psychological research has been positivism. Positivistic methodology is predicated on the idea that objective reality is present in the world outside the research process and the aim of the researcher is to discover it in its original condition (May, 1999, pp. 10-11). As the thesis aimed to build on the existing self-affirmation research by drawing testable hypotheses from it, the thesis also adopted a positivistic methodological position. This suggested that quantitative research methods commonly associated with positivism would be appropriate. Among these, the experimental method, which allows the researcher to assess the effect of one variable on another in controlled settings by building in safeguards, such as random assignment of participants to the experimental and control conditions, was deemed the most suitable to answer the research questions and meet the aims of the thesis (Hammond & Wellington, 2013, p. 70). A similar experimental design was employed throughout the studies in the thesis. In a nutshell, each study included the following components: (1) baseline measures of fruit and vegetable consumption; (2) a self-affirmation or non-affirmation manipulation; (3) a health message about eating at least 5 portions of fruit and vegetables every day; (4) measures of intentions, predictors of intentions and other cognitions related to eating

at least 5 portions of fruit and vegetables every day, (5) these same measures and the measures of actual fruit and vegetable consumption after a designated follow-up period; (6) a debriefing procedure. Any variations to the general procedure of the studies in the thesis are outlined in the relevant chapters.

Analytical Approach

Fruit and vegetable consumption data were collected using several different scales in an effort to increase confidence in the findings. This meant that, before descriptive and inferential analyses were run on the aggregate data, the scores on each individual measure of fruit and vegetable consumption were converted into standardised z scores before being combined into a single z score. Further, the standardised data were subjected to a log-transformation to reduce the impact of outliers, which might unduly bias the mean and increase standard deviation if left untreated (Field, 2005, p. 67). In addition, data on expectancies and one of the measures of fruit and vegetable consumption corresponding to them were also subjected to similar z- and log-transformations to ensure comparability with one another and to guard against any bias due to outliers. The data on intentions, the predictors of intentions and other cognitions, which were collected using continuous measures across a number of categorical groups, were analysed using Analysis of Variance (ANOVA). The data on fruit and vegetable consumption were analysed in a similar fashion, but to account for the pre-treatment differences in consumption, participants' baseline fruit and vegetable consumption was taken into account by using Analysis of Covariance (ANCOVA). Additionally, a longitudinal research aspect was built into Study 2 and 3 to determine any fluctuations in the effects of self-affirmation on behaviour, intentions, the predictors of intentions and other cognitions across time. Where the behavioural effects were found, they were also tested in a conservative intention-to-treat analysis, with the missing data imputed

from the mean of baseline scores (Sheeran, Aubrey, & Kellett, 2007). At the request of the thesis's supervisor, data were also collected on several variables tangential to the research aims of the thesis; findings concerning these variables were omitted in the interests of focus and brevity.

CHAPTER TWO

Study 1

Exploring the Effects of Self-Affirmation on Implicit Motivation and Intentions to Consume Fruit and Vegetables

Reasonable evidence has accumulated in published self-affirmation literature on the ability of self-affirmation to promote intentions, but only limited evidence on its ability to promote behaviour (Harris & Epton, 2009). Following Sheeran et al.'s (2013) proposition that non-conscious goal pursuit can act in synergy with conscious goal pursuit, at this point in self-affirmation research it would be useful to explore whether the effects of self-affirmation can also be captured at the implicit level. Additionally, delving deeper into the predictors of intentions might explain how the effects of self-affirmation on intentions are produced. This knowledge will help to design more effective interventions by incorporating into them the elements known to be affected by self-affirmation. Study 1 aims to follow the above research avenues by investigating the effects of adding a self-affirmation manipulation to a persuasive health message on a measure of implicit motivation and fine-grained measures of intentions and their predictors.

Implicit Cognition

Implicit cognition, that is, cognition "unavailable to self-report or introspection" (Greenwald & Banaji, 1995, p. 5), has been shown to predict variance in explicit cognition, that is, "self-reportable" cognition (Greenwald & Banaji, 1995, p. 5), and behaviour (e.g., von Hippel, Brener, & von Hippel, 2008; Conner, Perugini, O'Gorman, Ayres, & Prestwich, 2007). Most research concerned with the implicit predictors of behaviour has concentrated on implicit attitudes. These were found to have effects on habitual behaviours, with the relationship between implicit attitudes and behaviour

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being moderated by the level of habitualness of behaviour: the more habitual the behaviour is, the more predictive implicit attitudes are of that behaviour (Conner et al., 2007).

Commonly, the effects of implicit cognitions have been studied using the experimental procedure called the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998), a computerised task employing two evaluative and two object categories of concepts that are classified into categories on one of two response keys. It is postulated that the stronger the associations between evaluative and object categories, the faster the reaction time when the two categories are classified on the same key. For example, in a classic IAT study using the evaluative categories of concepts of "good" and "bad" and the object categories of concepts of "white face" and "black face", white participants were faster to classify stimuli belonging to "good" and "white face" categories and to "bad" and "black face" categories when they were classified on the same response key, as opposed to when they were classified on different response keys, suggesting that white participants had a habitual tendency to evaluate black and white race in this way (Cunningham, Preacher, & Banaji, 2001). More recently, Ostafin and Marlatt (2008) extended the use of the IAT to studying implicit motivation in the context of alcohol consumption. This was achieved by employing words indicative of approach (e.g., advance) or avoidance (e.g., escape) motivation tendencies in lieu of the usual evaluative dimensions (e.g., good-bad) and using "alcohol" and "water" as complementary object categories.

The IAT has been the tool of choice for the majority of research into implicit cognition (Karpinski & Steinman, 2006) and has influenced the claim that a significant proportion of social cognition happens outside people's awareness (Bargh & Ferguson, 2000). Originally, the IAT required the availability of two clearly contrasting concepts

to compare the strengths of associations between them. Greenwald and Farnham (2000) give an extensive list of the most often used complementary pairs in the IAT, such as "positive-negative (valence)", "self-other", "male-female", etc., (p. 1023). This requirement has made difficult the application of the IAT to studying concepts that do not have an obvious complementary pair, such as fruit and vegetable consumption. However, the recent development of the Single Category Implicit Association Test (SC-IAT; Karpinski & Steinman, 2006) has overcome this limitation. Like the IAT, the SC-IAT is a timed procedure that postulates that shorter reaction times are indicative of stronger associations but, instead of measuring the "relative strength of pairs of associations", it measures "absolute strengths of single associations" (Greenwald & Farnham, 2000, p. 1023). To illustrate, Karpinski and Steinman (2006) assessed attitudes to Coke and Pepsi soft drink brands in the IAT by comparing the strength of associations with Coke products against those with Pepsi products on the "pleasant-unpleasant" dimension. In two separate SC-IATs, one for Coke and the other for Pepsi brand, they also assessed attitudes to Coke and Pepsi on the "good-bad" dimension by comparing the strength of associations in the scenario when the brand's products were classified together with good words against that when the brand's products were classified together with bad words.

Several studies have used the SC-IAT to assess the importance of some implicit constructs for cognitive and behavioural outcomes and found these to account for a significant amount of variance in outcomes beyond that accounted for by their explicit counterparts. For example, von Hippel, Brener and von Hippel (2008) showed that, among drug and alcohol nurses, implicit prejudice towards administering drugs to patients significantly mediated the relationship between job-related stress and intentions to quit the job alongside other mediators, including explicit prejudice. This type of

finding, in which implicit cognition has an effect on explicit predictors of behaviour, has been interpreted by de Bruijn, Keer, Conner and Rhodes (2012) as indicating the need to look beyond the scope of the classic behaviour models when developing health interventions. Further, in the recent literature review on the relationship between nonconscious processes and health, Sheeran et al. (2013) deemed the exclusive focus of the classic behaviour models on explicit processes "difficult to sustain" given the state of research literature on the impact of implicit processes on health-related cognitions and behaviour (p. 468).

Explicit Cognition

In contrast to implicit cognition, explicit cognition has been postulated to have an effect on controlled behaviours (Conner et al., 2007), which renders it an important factor in the process of deliberative behaviour change. Indeed, explicit intentions, one of the more often studied constructs of explicit cognition, are a direct predictor of behaviour and have been estimated to explain more than a quarter (27%) of behavioural variance in TPB-based studies (Armitage & Conner, 2001). The upshot of this is that explicit intentions provide a worthy target for health interventions, including those based on self-affirmation. Having said that, the self-affirmation literature lacks studies that show both the effects of self-affirmation on intentions and the mediating role of intentions on the self-affirmation-behaviour relationship. This suggests a need to look deeper into the nature of intentions produced in the wake of self-affirmation, which can be achieved by employing a finer measurement tool for intentions and their predictors.

One such tool is measures of constructs from the two-component TPB (Conner & Sparks, 2005), which extends the classic TPB so that each predictor of intentions is divided into two separate constructs. Specifically, the two-component TPB distinguishes cognitive and affective dimensions in attitudes, with the former referring

to the beliefs and judgements about the attitude object and the latter to the feelings and emotions linked to it. It subdivides subjective norm into the injunctive and descriptive constructs, which are concerned with what significant others think about how the person should behave and whether other people behave in that way, respectively. Perceived behavioural control is divided into perceived control and self-efficacy, which refer to the control that the person perceives he or she has over the behaviour and the person's belief in his or her ability to perform that behaviour, respectively. Employing these finer measures could make it easier to identify any effects of self-affirmation on intentions and their predictors, which is suggested by the findings of increased measurement variability in exercise behaviour afforded by the two-component TPB (Courneya, Conner, & Rhodes, 2006).

Cognition-Behaviour Mechanisms

Given the lack of robust effects of self-affirmation on the predictors of intentions as postulated by the TPB, it would also be justifiable to widen the scope of potential mechanisms of self-affirmation under investigation. One such mechanism is expectancies about performance, that is, peoples' estimates of their success on a task (Cadinu, Maass, Frigerio, Impagliazzo, & Latinotti, 2003). When positive, expectancies have been shown to facilitate performance. To illustrate, McKay, Lewthwaite and Wulf (2012) found that, over and above abilities, leading participants to believe that they were particularly suited to a throwing accuracy task improved their performance on that task compared to participants provided with neutral information. Given a link between expectancies and performance, it is notable that self-affirmation has been shown to combat negative expectancies, thereby resulting in better performance. For example, Martens, Johns, Greenberg and Schimel (2006, Study 1) demonstrated that, in a stereotype threat condition, self-affirmed women performed better on a mathematical

task than non-affirmed women, and similarly to men and women in a neutral condition. These findings suggest that self-affirmation might also be able to enhance expectancies for health-related behaviours. It would, therefore, be informative to investigate whether self-affirmation leads to the formation of more positive but realistic expectancies about fruit and vegetable consumption. Expectancies are better grounded in reality than intentions (Lo, Smith, Taylor, Good, & von Wagner, 2012; Warshaw & Davis, 1985) and so, when coupled with the ability of self-affirmation to produce more open-minded assessment of feasibility, might better predict fruit and vegetable consumption behaviour than intentions.

Another potential mechanism of the effects of self-affirmation is improved self-regulation. Self-regulation is an integrative term denoting "the processes by which individuals direct their thoughts, emotions, and behaviours in order to achieve their goals" (Cameron & Chan, 2008, p. 263). One construct included under the umbrella of self-regulation is action control, which consists of the "awareness of standards" (i.e., cognitive maintenance of the criteria for behaviour), "self-monitoring" (i.e., evaluation of the adherence to the criteria for behaviour) and "self-regulatory effort" (i.e., response to discrepancies between the criteria for behaviour and actual behaviour) (Sniehotta et al., 2006, p. 87). The last two components of action control were found not only to explain additional variance in health-related behaviour (11% for HIV medication adherence and 6% for intensive exercise behaviour) over and above that explained by intentions, but also to mediate the intention-behaviour relationship (de Bruin et al., 2012), making action control a promising potential mediator in health-related self-affirmation research. Another self-regulatory construct worthy of the attention of self-affirmation researchers is perceived self-regulatory success, understood as the ability to adequately evaluate one's success in dealing with issues requiring self-control (Fishbach

et al., 2003). High levels of perceived self-regulatory success were shown to help

people to ward off temptations, such as withstanding temptation when faced with sweets

(Fishbach et al., 2003). In short, it seems that successful self-regulators tend to adopt a

global mind-set when dealing with self-regulatory dilemmas, the tendency postulated by

Harris (2011) to be enhanced by self-affirmation, which might be fruitfully exploited in

promoting health-related behaviour.

The Current Study

To investigate the above research avenues, Study 1 aimed to examine the effect

of self-affirmation on (a) implicit motivation and (b) measures of intentions and their

predictors from the two-component TPB, and investigate (c) the mechanisms underlying

these effects in the context of fruit and vegetable consumption. To pursue these aims,

the current study extended the usual experimental framework for the self-affirmation

research with the SC-IAT. The SC-IAT was placed after the self-affirmation

manipulation and health message, but before the explicit measures of the constructs

from the two-component TPB, an order deemed optimum for studies that involve both

implicit and explicit measures (Karpinski & Steinman, 2006).

In the current study, participants reported their baseline fruit and vegetable

consumption, were either self-affirmed or non-affirmed, read a health message about

fruit and vegetable consumption, completed SC-IAT measures of implicit motivation,

two-component TPB measures of intentions and their predictors, measures of action

control and expectancies related to fruit and vegetable consumption, and after 7 days

reported their feelings of perceived self-regulatory success related to fruit and vegetable

consumption and actual fruit and vegetable consumption. It was hypothesised that self-

affirmed participants would show (a) stronger implicit motivation, (b) stronger

intentions and their predictors, (c) more positive but realistic expectancies, (d) stronger

feelings of action control and perceived self-regulatory success, and (e) greater fruit and vegetable consumption at the 7-day follow-up.

Method

Design

The study had a two-way, between-participants experimental design, with the manipulated independent variables of self-affirmation (non-affirmed, self-affirmed) and SC-IAT order ("approach or fruit and vegetables" versus "avoid", followed by "approach" versus "avoid or fruit and vegetables" ["approach 1st"]; "approach" versus "avoid or fruit and vegetables", followed by "approach or fruit and vegetables" versus "avoid" ["avoid 1st"]). See Figure 1 for the SC-IAT computer screen templates and Table 2 for their order of presentation in the SC-IAT order conditions. Among the principal dependent variables were measures of implicit motivation plus measures of intentions to consume fruit and vegetables and their predictors from the two-component TPB, action control and expectancies related to fruit and vegetable consumption, and measures of perceived self-regulatory success and self-reported fruit and vegetable consumption taken after 7 days.

Figure 1. Computer screen templates A (left screen) and B (right screen) in the SC-IAT.

Table 2.

The Order of Presentation of the Screen Templates in the SC-IAT Order Conditions

SC-IAT Order Condition	Screen Template	
Approach 1st	A	B
Avoid 1st	B	A

Participants

Participants were recruited by email from a pool of research staff and graduate and undergraduate students to take part in a study of diet and health beliefs, with participation being rewarded either with credits (for first year Psychology students) or £5 (for the remainder). Willing participants ($N = 798$) followed a link to an online site containing eligibility measures; of these, 171 already ate at least 5 portions of fruit and vegetables on a typical day and found it easy to do and 429 disliked at least one of the focal fruit and vegetables in the SC-IAT. As a result, 198 participants were found to be eligible. The first 62 (31.3%) eligible participants who arranged for a laboratory session comprised the Time 1 sample. This sample had a mean age of 21.00 years ($SD = 5.06$, range 18-50 years) and was composed predominantly of first year Psychology students (46.8%, $n = 29$), females (80.6%, $n = 50$), and people who described themselves as being of white Caucasian origin (77.4%, $n = 48$)[3]. Of the Time 1 sample, $n = 58$ (93.5%) were retained at Time 2, the 7-day follow-up (Figure 2).

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[3] The remaining participants described themselves as of Asian (12.9%, $n = 8$), black (3.2%, $n = 2$) or mixed (4.8%, $n = 3$) ethnic origin, or withheld information (1.6%, $n = 1$).
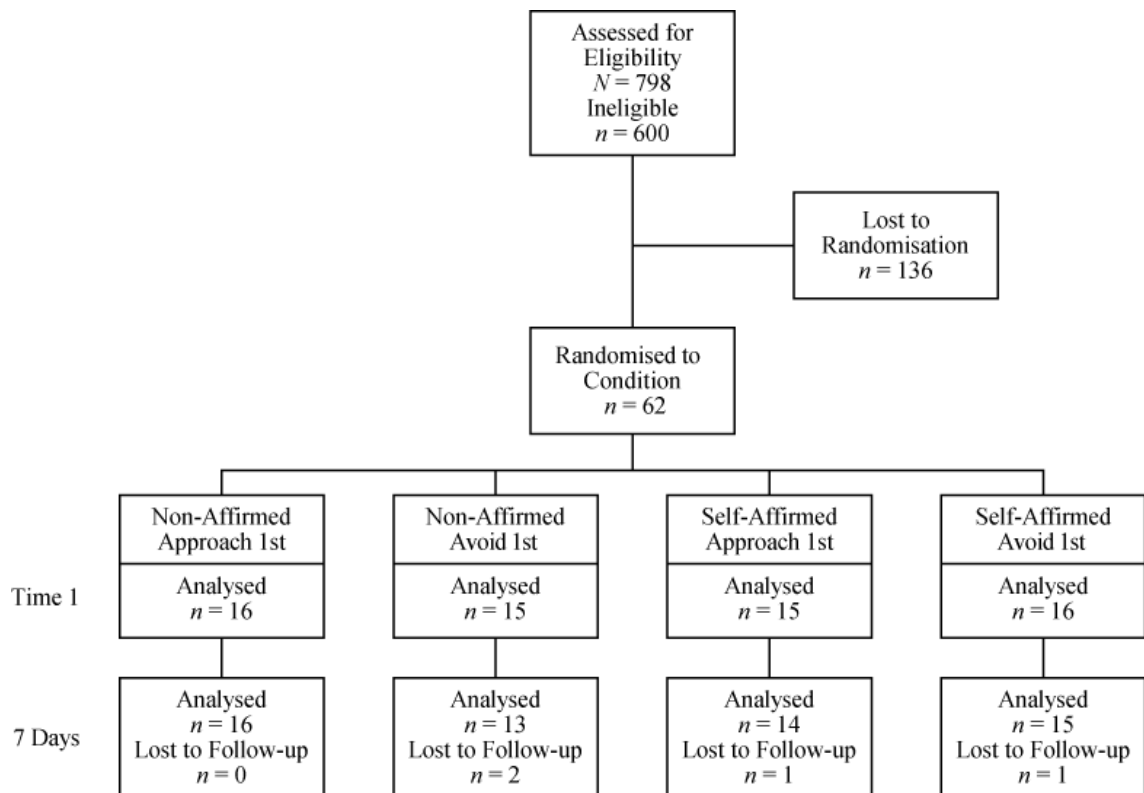
Figure 2. Participant flow through Study 1.

Materials

Pre-test measures. Pre-test measures included demographic questions about sex, age and ethnicity, information about fruit and vegetable portion sizes, eligibility measures and fruit and vegetable consumption measures. The eligibility measures consisted of two items. One eligibility item (henceforward referred to as the "consumption eligibility item") was adapted from Wiedemann et al.'s (2009) study and aimed to identify those who were already successfully meeting the guidelines on the recommended daily fruit and vegetable consumption and, thus, did not need help with this behaviour: "Currently, do you eat at least 5 portions of fruit and vegetables on a typical day?" (1, *no, and I do not intend to do so*; 2, *no, but I am thinking about it*; 3, *no, but I strongly intend to*; 4, *yes, but it is difficult for me*; 5, *yes, and it is easy for me*). The other eligibility item (henceforward referred to as the "dislike eligibility item") aimed to identify those who had a dislike of one or more of the focal fruit and

vegetables used in the SC-IAT (carrots, lettuce, tomatoes, apples and bananas; listed together with two filler items, oranges and peppers) in order to make sure that any effects of self-affirmation were not cancelled out by a habitual tendency to avoid the focal fruit and vegetables. Measures of fruit and vegetable consumption included measures for a typical day and week, with each containing a link to an online NHS leaflet providing pictorial examples of portions for some types of fruit and vegetables. Typical daily consumption was measured separately for fruit and vegetables on measures developed by Steptoe et al. (2003), "How many portions of fruit – of any kind – do you eat on a typical day?" and "How many portions of vegetables do you eat on a typical day?". A space was provided for open-ended answers and participants were instructed to count fruit juice only as one portion regardless of how much they drank and to exclude potatoes (Appendix 1). Typical weekly consumption was measured by the vegetable food section of the Eating Habits Questionnaire (Wardle, Parmenter, & Waller, 2000). This consisted of the stem "In a typical week, about how many portions do you eat of the following foods?" followed by a list of items: "pasta or rice", "potatoes", "peas", "beans (baked, tinned, or dried) or lentils", "other vegetables (any type)" and "fruit (fresh, frozen, canned)", answered on a 7-point scale (*none*; *less than 1 a week*; *1-2 a week*; *3-5 a week*; *6-7 a week*; *8-11 a week*; *12 or more a week*). A space was provided at the end of the measure to record any fruit and vegetables consumed but not included in the list (e.g., dried fruit) and the categories of "pasta or rice" and "potatoes" were excluded for the purposes of scoring (Appendix 3). After standardisation, the two measures of fruit and vegetable consumption had satisfactory internal reliability ($\alpha = .79$) and were combined into a single measure of baseline consumption before being log-transformed.

Self-affirmation manipulation. A (slightly) modified version of the self-affirmation manipulation developed by Sherman et al. (2009) was used to self-affirm participants. It listed 10 values that were described as having been nominated by other people as important: artistic skills/aesthetic appreciation; sense of humour; relations with friends; spontaneity/living life in the moment; social skills; musical ability/appreciation; physical fitness/health; political activism; business/money; and academic achievement. Participants in the self-affirmation condition were instructed to choose the most important value to them, while those in the non-affirmation condition were instructed to choose the least important value to them. If the value that participants considered most/least important was not included in the list, a space was provided to record that value. For participants in the self-affirmation condition, this was followed by an instruction to support their choice with three reasons why their most important value was important to them and an example of what they did that demonstrated how this value was important to them. For participants in the non-affirmation condition, similar instructions were provided except that they were asked to give three reasons why their least important value might be important to another person and what that other person might have done to demonstrate how important this value was to them. A space of three lines was provided for each reason and the example (Appendix 4).

Self-affirmation manipulation checks and potential mediators. To assess the success of the self-affirmation manipulation, 4 items (Cerully, 2011, $\alpha = .85$) asked participants to rate the importance of the value they had just written about in terms of whether it influenced their life, whether in general they tried to live up to this value, whether this value was an important part of who they were, and whether they cared about this value, e.g., "This value has influenced my life" (1, *strongly disagree*, 7,

strongly agree). Additionally, retrospective self-affirmation manipulation check items were placed after the Time 1 dependent measures: eight thought-centred items (Napper et al., 2009, α = .85), "The task on values made me think about...", e.g., *things I don't like about myself* [1] - *things I like about myself* [7]; two awareness-centred items (Napper et al., 2009, α = .85), "The task made me aware of..." "... who I am" and "... my values (the principles and standards by which I try to live my life)" (1, *strongly disagree*, 7, *strongly agree*), presented together with two filler items; and two feeling-centred items (adapted from Sherman et al., 2000, α = .85), "How did the task make you feel about yourself?" *poorly* [1] – *extremely positive* [6], and "Good about myself" *not at all* [1] – *extremely* [6].

A measure of mood (Aarts & Dijksterhuis, 2003, *α* = .80), "Right now I feel…" *sad* [1] - *happy* [7], *displeased* [1] - *pleased* [7], *calm* [1] - *excited* [7], and *tired* [1] - *energetic* [7], assessed whether differences in mood mediated the self-affirmation effects. In addition, given the findings of Crocker et al. (2008) that self-affirmation promoted positive other-related affect, this was also assessed using a shorter version of their measure (*α* = .80), "Right now I feel…" "… loving/[joyful/giving/connected]" (1, *not at all*, 5, *extremely*).

Health message. The health message (971 words in length) was based on materials from the UK Department of Health (2010b) describing the health effects of eating fruit and vegetables and augmented with information about the link between the reduced chances of developing heart disease for people eating 5 portions of fruit and vegetables a day (Crowe et al., 2011). In providing information about the link between fruit and vegetable consumption and reduced incidence of heart disease, the aim of the health message was to encourage participants to increase their fruit and vegetable consumption. The health message was conceptually subdivided into two distinct parts:

threat and response. The threat part of the message described research that found a link between a diet poor in fruit and vegetables and heart disease, some cancers and other chronic conditions and explained how eating fruit and vegetables reduces the incidence of these conditions. The response part of the message suggested practical ways of increasing fruit and vegetable consumption, such as carrying easy to eat fruit when on the move, and provided sources of further information (Appendix 5).

Single Category Implicit Association Test. The SC-IAT was a computerised task based on the procedure developed by Karpinski and Steinman (2006) and implemented in E-Prime 1. The task involved classifying words for fruit and vegetables and words indicative of approach and of avoidance motivation tendencies into categories using two different computer screen templates. Approach motivation tendencies were represented by the words "closer", "toward", "consume", "eat" and "swallow"; and avoidance motivation tendencies were represented by the words "ignore", "withdraw", "reject", "refuse" and "leave". These items were inspired by the stimuli used in Ostafin and Marlatt's (2008) study to represent automatic motivation tendencies towards alcohol consumption and were adapted to suit the fruit and vegetable consumption context of the study. Fruit and vegetable words were "apple", "banana", "carrot", "lettuce" and "tomato", which were chosen on the basis of being the most often consumed fruit and vegetables, as reported by participants in pilot research. Computer screen template A instructed participants to classify approach and fruit and vegetable words into the same category and avoidance words into a separate category, whereas computer screen template B instructed participants to classify approach words into a separate category and avoidance and fruit and vegetable words into the same category (Figure 3).
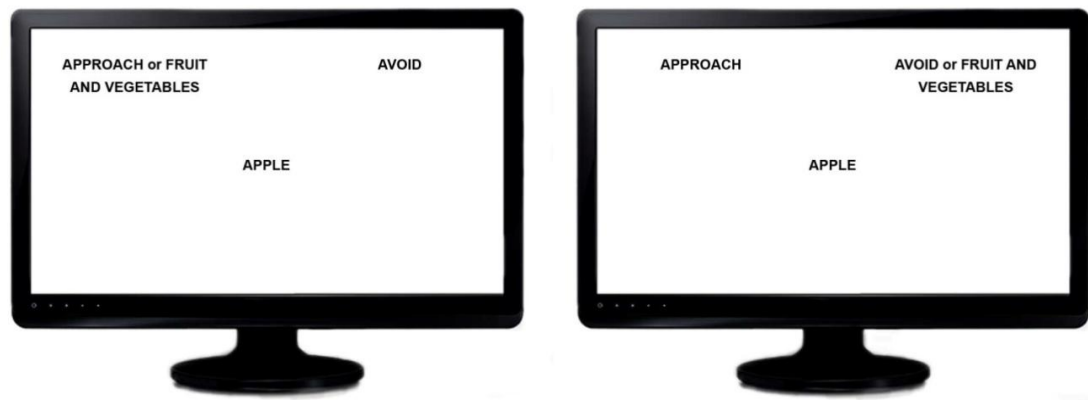
Figure 3. Examples of computer screens based on the screen template A (left screen) and B (right screen).

The order of presentation of the computer screen templates was counterbalanced across participants to control for order effects: first A, then B for the approach 1st condition; and first B, then A for the avoid 1st condition. A block of 24 practice and 72 test trials was based on each computer screen template. Each block of test and practice trials started with instructions explaining to participants the category dimensions and the correct key response to classify stimulus words. The approach/avoidance categories were positioned at either side at the top of the computer screen and were paired with the fruit and vegetable category according to the screen template, with a stimulus word presented in the middle of the screen. Both screen templates instructed participants to sort stimulus words into the categories presented on the left by pressing the "e" key and into the categories presented on the right by pressing the "i" key on the computer keyboard. This meant that when working on the block of screens based on screen template A, participants had to categorise "Approach or Fruit and Vegetable" words by pressing the "e" key and "Avoid" words by pressing the "i" key. For the screens based on the screen template B, "Approach" words were categorised using the "e" key and "Avoid or Fruit and Vegetable" words were categorised using the "i" key. A stimulus word remained on the screen until the participant provided a correct response, with wrong responses being signalled by a red "x" in the centre of the screen.

Principal dependent variables. Based on Greenwald, McGhee and Schwartz's (1998) postulate that shorter reaction times are indicative of stronger associations, the difference in response times to the scenario when the fruit and vegetable category was paired with the approach category and when the fruit and vegetable category was paired with the avoid category was operationalised as the measure of *implicit motivation* to consume fruit and vegetables.

Intentions and cognitions were assessed using the measures of constructs from the two-component TPB. These were based on the measures used by Harris et al. (2007) to assess cognitions related to smoking cessation and developed and extended for the fruit and vegetable context of the current study.[4] *Intentions* were measured by three items (αs $\geq$ .78), "I intend eating at least 5 portions of fruit and vegetables every day in the next 7 days" (1, *strongly disagree*, 7, *strongly agree*; 1, *definitely no*, 7, *definitely yes*) and "How likely is it that you will eat at least 5 portions of fruit and vegetables every day in the next 7 days?" (1, *very unlikely*, 7, *very likely*).[5] *Expectancies* were measured by two items (αs $\geq$ .37) adapted from Steptoe et al.'s (2003) study, one each for fruit and vegetables, "In the next 7 days, how many portions of fruit – of any kind – do you expect to eat on a typical day?" and "In the next 7 days, how many portions of vegetables do you expect to eat on a typical day?"[6] Answers to these were provided in an open-ended format, but participants were instructed to count fruit juice as one portion only and to not count potatoes.

Attitude items followed the stem "For me eating at least 5 portions of fruit and vegetables every day in the next 7 days would be" and comprised four items measuring

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[4] Throughout the thesis, unless a source is cited, items were developed specifically for the purposes of the study.

[5] For variables taken at several time points, α values are normally presented as a range in the thesis.

[6] As preferences for fruit and vegetables might differ, modest α values were expected on the two measures of expectancies.

affective attitudes (*α*s ≥ .78), *unenjoyable* [1] - *enjoyable* [7], *boring* [1] - *fun* [7], *painful* [1] - *pleasurable* [7], *bad* [1] - *good* [7], and four items measuring *cognitive attitudes* (*α*s ≥ .90), *foolish* [1] - *wise* [7], *harmful* [1] - *beneficial* [7], *useless* [1] - *useful* [7], *unimportant* [1] - *important* [7].

    Injunctive norm was measured by three items (*α*s ≥ .34), "Most people who are important to me think that I should eat at least 5 portions of fruit and vegetables every day in the next 7 days" (1, *strongly disagree*, 7, *strongly agree*; 1, *very unlikely*, 7, *very likely*) and "People who are important to me would disapprove/approve of me eating at least 5 portions of fruit and vegetables every day in the next 7 days" (1, *disapprove*, 7, *approve*). The exclusion of the last injunctive norm item led to an improved internal reliability (*α*s ≥ .83) and the shorter list of measures was used in the analyses. *Descriptive norm* was measured by three items (*α*s ≥ .87), "Most people I know will eat at least 5 portions of fruit and vegetables every day in the next 7 days" (1, *strongly disagree*, 7, *strongly agree*; 1, *very unlikely*, 7, *very likely*) and "Of the people you know, how many will eat at least 5 portions of fruit and vegetables every day in the next 7 days?" (1, *none*, 7, *all*).

    Perceived control was measured by three items (*α*s ≥ .84), "How much control do you have over whether or not you will eat at least 5 portions of fruit and vegetables every day in the next 7 days?" (1, *no control*, 7, *complete control*), "I feel in complete control of whether or not I will eat at least 5 portions of fruit and vegetables every day in the next 7 days" (1, *strongly disagree*, 7, *strongly agree*), and "It is up to me whether or not I will eat at least 5 portions of fruit and vegetables every day in the next 7 days" (1, *strongly disagree*, 7, *strongly agree*). *Self-efficacy* was measured by three items (*α*s ≥ .89), "I know for sure that if I wanted to I could eat at least 5 portions of fruit and vegetables every day in the next 7 days" (1, *strongly disagree*, 7, *strongly agree*), "If I

wanted to, I could easily eat at least 5 portions of fruit and vegetables every day in the next 7 days" (1, *strongly disagree*, 7, *strongly agree*), and "If I wanted to, I would find eating at least 5 portions of fruit and vegetables every day in the next 7 days easy" (1, *strongly disagree*, 7, *strongly agree*).

Action control was measured in addition to the two-component TPB constructs. Six prospective *action control* items (αs = .92), adapted from Sniehotta et al.'s (2006) study, followed the stem "During the next 7 days, I will …" and assessed awareness of standards, e.g., "… often have an intention to eat at least 5 portions of fruit and vegetables every day on my mind", monitoring, e.g., "… consistently monitor whether I eat at least 5 portions of fruit and vegetables every day", and effort, e.g., "… really try hard to regularly eat at least 5 portions of fruit and vegetables every day", (1, *strongly disagree*, 7, *strongly agree*) (Appendix 6).

Follow-up measures. The measures of fruit and vegetable consumption (α = .40), two-component TPB constructs and expectancies were taken again at 7 days. Additionally, the follow-up measures included *perceived self-regulatory success* measures (adapted from Fishbach et al.'s, 2003, Study 4; α = .80) that followed the stem "During the last 7 days …" and included 3 items, "... I was successful in monitoring my fruit and vegetable consumption", "... I was successful in eating at least 5 portions of fruit and vegetables every day", and "... I found it difficult to eat at least 5 portions of fruit and vegetables every day", answered on a 7-point scale (1, *not at all*, 7, *extremely*), with the last item being recoded.

Procedure

Pre-test measures were completed online using SurveyGizmo (version 2) software and started with the demographic questions before proceeding to the information about portion sizes for fruit and vegetables and the consumption eligibility

item.[7] At this stage, those indicating that at the time they ate at least 5 portions of fruit and vegetables on a typical day and found it easy to do were thanked for volunteering but did not proceed further. The remaining participants proceeded to fill in the two measures of fruit and vegetable consumption and the dislike eligibility item. Those indicating a dislike of at least one of the focal fruit and vegetables in the SC-IAT were thanked for volunteering but did not proceed further. The remainder were provided with information about the study and asked to give informed consent for participation. Participants consenting to participate in the study were invited to make an appointment for a laboratory session where they were randomly assigned to complete either a self-affirmation or non-affirmation (control) task. The experimenter was blind to the self-affirmation condition, which was ensured by making the first page of the experimental materials look identical across conditions and arranging them in an order defined by a random number generator. Once arranged, the pile of materials was placed at the entrance to the laboratory, with each participant helping themselves to a copy at the beginning of the laboratory session. After working on the self-affirming or non-affirming task and completing the measures of positive other-related affect, positive affect and the importance of the chosen value, participants read the health message. This was followed by the SC-IAT task, a particular version of which was assigned to each participant with the help of a random number generator and set up by the experimenter before the start of the laboratory session. Then participants filled in the measures of the two-component TPB, expectancies, action control and retrospective self-affirmation checks. After 7 days, participants completed the follow-up measures online. These concluded with a funnel debriefing procedure (Chartrand & Bargh, 1996).

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[7] The same online software package was utilised for all online components of the studies in the thesis.

<div align="center">

Results

</div>

Preliminary Checks

There were no differences between ineligible ($n = 600$) and eligible ($n = 198$) participants in age, $F(1, 796) < 1$, sex, $\chi^2(1, N = 798) = 1.77$, $p = .183$, or ethnicity (collapsed into the categories of "white" and "other" ethnic group to meet the requirement for the expected cell count), $\chi^2(1, N = 798) = 1.17$, $p = .279$, (Table 3).

Table 3.
Characteristics of Ineligible and Eligible Participants

Variable		Ineligible	Eligible	Full Sample
		$n = 600$	$n = 198$	$N = 798$
Age				
	M	22.28	22.10	22.23
	SD	(5.89)	(5.46)	(5.79)
Sex				
	Male	173	67	240
	Female	427	131	558
Ethnicity				
	White	439	137	576
	Other	161	61	222

Eligible participants who did not attend the laboratory session ($n = 136$) did not differ from those who did ($n = 62$) in age, $F(1, 196) = 3.72$, $p = .055$[8], $\eta p^2 = .019$, or ethnicity (collapsed as above), $\chi^2(1, N = 198) = 2.87$, $p = .090$, but the latter were more likely to be female, $\chi^2(1, N = 198) = 8.46$, $p = .004$. There were no differences between those who did not attend the laboratory session and those who did on the baseline measure of fruit and vegetable consumption, $F(1, 196) < 1$, (Table 4). The small number of participants who did not complete the follow-up ($n = 4$) prevented their data from being subjected to inferential analyses.

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[8] Although the difference between eligible participants who did and did not attend the laboratory session approached significance, it only amounted to 1.6 years, with both groups being in their early twenties.

Table 4.

Characteristics of Eligible Participants Who Did Not Attend and Attended the Laboratory Session

Variable		Did Not Attend Lab Session	Attended Lab Session	Full Sample
		$n = 136$	$n = 62$	$N = 198$
Age		22.60	21.00	22.10
		(5.58)	(5.06)	(5.46)
Sex				
	Male	55	12	67
	Female	81	50	131
Ethnicity				
	White	89	48	137
	Other	47	14	61
Baseline consumption (z scores)[a]		0.59	0.58	0.59
		(0.09)	(0.11)	(0.10)

Note. Unless specified, means with standard deviations in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

Randomisation Checks

To determine the success of randomisation to conditions, age, sex and the baseline measure of fruit and vegetable consumption were analysed in two-way, between-participants ANOVAs, with the independent variables of self-affirmation and SC-IAT order.[9] No differences were found between any of the conditions in age, largest $F(1, 58) = 1.82$, $p = .180$, $\eta p^2 = .030$ (for the self-affirmation x SC-IAT order interaction), sex, largest $F(1, 58) = 1.95$, $p = .168$, $\eta p^2 = .033$ (for the self-affirmation x SC-IAT order interaction), or on the baseline fruit and vegetable consumption measure, all F's$(1, 58) < 1$, suggesting that randomisation to conditions was successful (Table 5).

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[9] A violation of the expected cell count assumption prevented a Chi-square analysis from being run on sex.

Table 5.
Baseline Sample Characteristics

Variable	Non-Affirmed		Self-Affirmed		Full Sample
	Approach 1st	Avoid 1st	Approach 1st	Avoid 1st	
	$n = 16$	$n = 15$	$n = 15$	$n = 16$	$N = 62$
Age	22.56	19.93	20.27	21.13	21.00
	(7.98)	(1.49)	(2.52)	(5.30)	(5.06)
Sex[a]	0.87	0.80	0.67	0.87	0.81
	(0.34)	(0.41)	(0.49)	(0.34)	(0.40)
Baseline consumption (z scores)[b]	0.58	0.58	0.59	0.59	0.58
	(0.11)	(0.11)	(0.11)	(0.09)	(0.11)

Note. Standard deviations are in parentheses. [a]Scored: male = 0, female = 1. [b]Scores were log-transformed to reduce the impact of outliers.

Self-Affirmation Manipulation Checks and Potential Mediators

Using a one-way ANOVA, with the independent variable of self-affirmation (non-affirmed, self-affirmed), there was a significant main effect of self-affirmation on the value importance, $F(1, 60) = 212.27$, $p < .001$, $\eta p^2 = .780$, and awareness-centred, $F(1, 60) = 5.43$, $p = .023$, $\eta p^2 = .083$, manipulation checks. The thought-centred, $F(1, 59) = 2.18$, $p = .145$, $\eta p^2 = .036$, and feeling-centred, $F(1, 60) = 2.65$, $p = .109$, $\eta p^2 = .042$, manipulation checks did not differ between non-affirmed and self-affirmed groups (Table 6). Taken together, these findings provide some evidence that participants were more self-affirmed in the experimental than the control group. In the funnel debriefing procedure no participant showed awareness of a link between self-affirmation manipulation and their responses to the dependent measures.

Table 6.

Means and Standard Deviations for Scores on the Measures of Self-Affirmation Manipulation Checks

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Self-affirmation manipulation checks			
	$n = 30^a$	$n = 31$	$N = 61$
Value importance	2.69	6.05	4.37
	(1.04)	(0.76)	(0.90)
Thought-centred	3.90	4.21	4.06
	(0.49)	(0.54)	(0.52)
Awareness-centred	4.36	4.69	4.65
	(0.74)	(0.97)	(0.86)
Feeling-centred	4.10	4.39	4.25
	(0.66)	(0.74)	(0.70)

Note. Standard deviations are in parentheses. [a]The drop in *n* is due to missing data on the thought-centred manipulation check measure.

The two potential mediators, positive other-related affect and positive affect, were significantly positively correlated, $r(61) = .53$, $p < .001$, indicating that it was appropriate to analyse these variables in a Multivariate Analysis of Variance (MANOVA). Using a one-way MANOVA (Wilk's Lambda), with the independent variable of self-affirmation (non-affirmed, self-affirmed) and two continuous dependent variables of positive other-related affect and positive affect, there was no significant multivariate main effect of self-affirmation on the potential mediators, $F(2, 58) < 1$. Participants across the groups had moderate to moderately high scores on these variables (Table 7).

Table 7.

Means and Standard Deviations for Scores on the Measures of Potential Mediators

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Potential mediators			
	$n = 30^a$	$n = 31$	$N = 61$
Positive other-related affect	4.50	4.81	4.66
	(1.11)	(1.14)	(1.12)
Positive affect	4.68	4.69	4.69
	(0.85)	(1.17)	(1.02)

Note. Standard deviations are in parentheses. [a]The drop in *n* is due to missing data on the positive affect measure.

Implicit Motivation

Before running the main analysis, a scoring algorithm developed by Greenwald, Nosek and Banaji (2003) was applied to the reaction times. The resultant difference scores were based on the difference in the reaction times to the scenario when the fruit and vegetable words were categorised on the same key as the words denoting approach motivation tendencies and when the fruit and vegetable words were categorised on the same key as the words denoting avoidance motivation tendencies. Negative difference scores indicated stronger implicit motivation tendencies to approach fruit and vegetables for the approach 1st group and weaker implicit motivation tendencies to approach fruit and vegetables for the avoid 1st group. Positive difference scores indicated weaker implicit motivation tendencies to approach fruit and vegetables for the approach 1st group and stronger implicit motivation tendencies to approach fruit and vegetables for the avoid 1st group. To achieve compatibility in the direction of difference scores between the SC-IAT order conditions, the sign of the difference scores for the avoid 1st group was reversed, making their difference scores interpretable in a similar fashion to those of the approach 1st group. Thus, negative difference scores indicated stronger approach motivation tendencies and positive difference scores indicated weaker approach motivation tendencies for participants in both SC-IAT order conditions.

The difference scores were subjected to a 2 x 2 between-participants ANOVA, with the independent variables of self-affirmation (non-affirmed, self-affirmed) and SC-IAT order (approach 1st, avoid 1st). There were no main effects of either self-affirmation, $F(1, 58) < 1$, ($M_{NA} = 0.37$, $SD = 0.34$; $M_{SA} = 0.41$, $SD = 0.33$) or SC-IAT order, $F(1, 58) < 1$, ($M_{APPROACH\ 1}{}^{st} = 0.35$, $SD = 0.30$; $M_{AVOID\ 1}{}^{st} = 0.43$, $SD = 0.37$) on the difference scores, nor was the interaction significant, $F(1, 58) < 1$. Overall, participants had stronger implicit motivation tendencies to avoid than to approach fruit and vegetables (Table 8).

Table 8.
Means and Standard Deviations for Difference Scores on the SC-IAT

Variable	Non-Affirmed		Self-Affirmed		Full Sample
	Approach 1st	Avoid 1st	Approach 1st	Avoid 1st	
	$n = 16$	$n = 15$	$n = 15$	$n = 16$	$N = 62$
Difference scores (sec)	0.33 (0.34)	0.42 (0.35)	0.37 (0.27)	0.44 (0.39)	0.39 (0.34)

Note. Standard deviations are in parentheses.

Behaviour

Given the primary focus of the study on the effects of self-affirmation and the evidence that the randomisation to condition was successful, the remaining analyses were carried out on differences between non-affirmed and self-affirmed groups only, with the SC-IAT order conditions collapsed within these groups.

Differences on the combined measure of fruit and vegetable consumption at Time 2 were evaluated in a one-way, between-participants ANCOVA, with the independent variable of self-affirmation (self-affirmed, non-affirmed) and the baseline combined measure of fruit and vegetable consumption entered as a covariate. The baseline measure of fruit and vegetable consumption was significantly associated with its Time 2 counterpart ($p < .001$), indicating that it was appropriate to introduce the covariate into the analysis. There was no main effect of self-affirmation on the measure

of fruit and vegetable consumption at Time 2, $F(1, 55) < 1$, with participants reporting similar fruit and vegetable consumption across the groups (Table 9).

Table 9.
Means and Standard Deviations for Scores on the Measure of Fruit and Vegetable Consumption at Time 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
	$n = 29$	$n = 29$	$N = 58$
Combined consumption	0.59	0.60	0.59
(z scores)[a]	(0.09)	(0.08)	(0.08)

Note. Standard deviations are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

Predictors of Behaviour

To test for the immediate effects of self-affirmation, data on intentions, expectancies and the predictors of intentions collected at Time 1 ($N = 62$) were analysed in one-way, between-participants ANOVAs, with the independent variable of self-affirmation (self-affirmed, non-affirmed). To test for any changes that might occur within the dependent variables in the long run, data on explicit intentions, expectancies and the predictors of intentions collected at Time 2 ($N = 58$) were analysed in one-way, between-participants ANCOVAs, with the independent variable of self-affirmation (self-affirmed, non-affirmed) and the corresponding Time 1 measures entered as a covariate. The covariates were significantly associated with their Time 2 counterparts (the largest $p = .040$ for cognitive attitudes), indicating that it was appropriate to introduce them into the Time 2 analyses.

Intentions and expectancies. There was no main effect of self-affirmation on either Time 1 intentions, $F(1, 60) < 1$, or expectancies, $F(1, 60) < 1$, nor on Time 2 intentions, $F(1, 55) = 2.55$, $p < .116$, $\eta p^2 = .044$, or expectancies, $F(1, 55) = 2.65$, $p <$

.109, $\eta p^2 = .046$. At both time points, participants across the groups had moderately

high scores on intentions (Table 10).[10]

Table 10.
Means and Standard Deviations for Scores on Intentions and Expectancies at Time 1 and 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Intentions			
	$n = 31$	$n = 31$	$N = 62$
Time 1	4.93	4.98	4.96
	(1.20)	(1.08)	(1.13)
	$n = 29$	$n = 29$	$N = 58$
Time 2	5.16	4.75	4.95
	(1.37)	(1.26)	(1.32)
Expectancies[a]			
	$n = 31$	$n = 31$	$N = 62$
Time 1	0.58	0.60	0.59
	(0.09)	(0.11)	(0.10)
	$n = 29$	$n = 29$	$N = 58$
Time 2	0.61	0.58	0.59
	(0.10)	(0.04)	(0.08)

Note. Standard deviations are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

To test whether self-affirmation affected the extent to which expectancies were more or less realistic, scores on the typical daily fruit and vegetable consumption at Time 2 were subtracted from scores on the expectancies about typical daily fruit and vegetable consumption at Time 1, meaning that optimistic expectancies corresponded to positive scores. Using one-sample t-tests, the means for non-affirmed, $t = 0.49$, $df = 28$, $p = .626$, and self-affirmed, $t = 0.43$, $df = 28$, $p = .672$, participants did not differ significantly from zero, suggesting both groups were realistic about their future fruit and vegetable consumption (Table 11).

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[10] The log-transformation of scores on expectancies prevented commenting on their magnitude. However, raw scores on expectancies suggested that both non-affirmed (Time 1: $M = 4.69$, $SD = 1.67$; Time 2: $M = 7.50$, $SD = 7.18$) and self-affirmed (Time 1: $M = 5.10$, $SD = 2.15$; Time 2: $M = 5.57$, $SD = 2.06$) participants expected to eat either around or more than 5 portions of fruit and vegetables every day in the next 7 days at both time points.

Table 11.

Means and Standard Deviations for Difference Scores Representing Optimism of Expectancies at Time 1

Variable	Non-Affirmed	Self-Affirmed	Full Sample
	$n = 29$	$n = 29$	$N = 53$
Difference scores[a]	-0.01	0.01	0.00
	(0.10)	(0.10)	(0.10)

Note. Standard deviations are in parentheses. [a]Scores of the minuend and subtrahend were log-transformed to reduce the impact of outliers.

Predictors of Intentions

Affective and cognitive attitudes. There was no main effect of self-affirmation on either Time 1 affective, $F(1, 60) < 1$, or cognitive, $F(1, 60) = 2.30$, $p = .135$, $\eta p^2 = .037$, attitudes, nor on Time 2 affective, $F(1, 55) < 1$, or cognitive, $F(1, 55) = 2.40$, $p = .127$, $\eta p^2 = .042$, attitudes. At both time points, participants across the groups had moderately high positive scores on affective attitudes and high positive scores on cognitive attitudes (Table 12).

Table 12.

Means and Standard Deviations for Scores on Affective and Cognitive Attitudes at Time 1 and 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Affective attitudes			
	$n = 31$	$n = 31$	$N = 62$
Time 1	5.51	5.67	5.59
	(1.12)	(0.78)	(0.96)
	$n = 29$	$n = 29$	$N = 58$
Time 2	5.57	5.75	5.66
	(0.98)	(0.83)	(0.90)
Cognitive attitudes			
	$n = 31$	$n = 31$	$N = 62$
Time 1	6.12	6.55	6.33
	(1.49)	(0.51)	(1.12)
	$n = 29$	$n = 29$	$N = 58$
Time 2	6.48	6.21	6.34
	(0.57)	(1.10)	(0.88)

Note. Standard deviations are in parentheses.

Injunctive and descriptive norm. There was no main effect of self-affirmation on either Time 1 injunctive, $F(1, 60) < 1$, or descriptive, $F(1, 60) < 1$, norm, nor on

Time 2 injunctive, $F(1, 55) < 1$, or descriptive, $F(1, 55) < 1$, norm. At both time points,

participants across the groups had moderately high scores on the injunctive norm and

moderately low scores on the descriptive norm (Table 13).

Table 13.
Means and Standard Deviations for Scores on Injunctive and Descriptive Norm at Time 1 and 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Injunctive norm			
	$n = 31$	$n = 31$	$N = 62$
Time 1	5.19	5.10	5.15
	(1.28)	(1.33)	(1.29)
	$n = 29$	$n = 29$	$N = 58$
Time 2	5.33	5.02	5.17
	(1.18)	(1.18)	(1.18)
Descriptive norm			
	$n = 31$	$n = 31$	$N = 62$
Time 1	3.47	3.25	3.36
	(1.40)	(1.20)	(1.30)
	$n = 29$	$n = 29$	$N = 58$
Time 2	3.75	3.39	3.57
	(1.52)	(1.20)	(1.37)

Note. Standard deviations are in parentheses.

Perceived control and self-efficacy. There was no main effect of self-

affirmation on either Time 1 perceived control, $F(1, 60) < 1$, or self-efficacy, $F(1,60) < 1$, nor on Time 2 perceived control, $F(1, 55) < 1$, or self-efficacy, $F(1, 55) < 1$. At both

time points, participants had moderately high scores on perceived control and self-

efficacy (Table 14).

Table 14.

Means and Standard Deviations for Scores on Perceived Control and Self-Efficacy at Time 1 and 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Perceived control			
	$n = 31$	$n = 31$	$N = 62$
Time 1	5.69	5.53	5.61
	(1.22)	(1.26)	(1.23)
	$n = 29$	$n = 29$	$N = 58$
Time 2	5.30	5.15	5.22
	(1.46)	(1.44)	(1.44)
Self-efficacy			
	$n = 31$	$n = 31$	$N = 62$
Time 1	5.26	5.27	5.26
	(1.48)	(1.59)	(1.52)
	$n = 29$	$n = 29$	$N = 58$
Time 2	4.98	4.94	4.96
	(1.73)	(1.59)	(1.65)

Note. Standard deviations are in parentheses.

Self-Regulatory Processes

Similarly to data on intentions, expectancies and the predictors of intentions, data on action control at Time 1 ($N = 62$) were analysed in a one-way, between-participants ANOVA and at Time 2 ($N = 58$) in a one-way, between-participants ANCOVA. Action control at Time 2 was significantly associated with its Time 1 counterpart ($p < .001$), indicating that it was appropriate to introduce it as a covariate into the Time 2 analysis. Data on perceived self-regulatory success were available only at Time 2 ($N = 58$) and were analysed in combination with Time 2 data on action control in a one-way, between-participants MANOVA (Wilk's Lambda), with the independent variable of self-affirmation (non-affirmed, self-affirmed). Time 2 action control and perceived self-regulatory success were significantly positively correlated, $r(58) = 0.63$, $p < .001$, indicating that it was appropriate to analyse these variables in a MANOVA.

There was no main effect of self-affirmation on either action control at Time 1, $F(1, 60) < 1$, analysed in ANOVA, or at Time 2, $F(1, 55) < 1$, analysed in ANCOVA.

In MANOVA, there was no significant multivariate main effect of self-affirmation on self-regulatory processes, $F(2, 55) < 1$. Participants across the groups had moderately high scores on action control at Time 1 and 2 and moderately low scores on perceived self-regulatory success at Time 2 (Table 15).

Table 15.
Means and Standard Deviations for Scores on Self-Regulatory Processes at Time 1 and 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Action control			
	$n = 31$	$n = 31$	$N = 62$
Time 1	4.82	5.08	4.95
	(1.48)	(0.89)	(1.22)
	$n = 29$	$n = 29$	$N = 58$
Time 2	4.70	4.63	4.66
	(1.22)	(1.27)	(1.23)
Perceived self-regulatory success			
	$n = 29$	$n = 29$	$N = 58$
Time 2	3.80	3.84	3.82
	(1.51)	(1.50)	(1.49)

Note. Standard deviations are in parentheses.

Discussion

The primary aim of the study was to test whether self-affirmation can produce detectable effects on an implicit measure of motivation and on explicit measures of intentions and their predictors from the two-component TPB (Conner & Sparks, 2005) in the context of fruit and vegetable consumption. It was hypothesised that self-affirmation would lead to stronger implicit motivation, intentions and their predictors; however, no such effects were found. A lack of evidence on the effect of self-affirmation on implicit motivation is an indication that it is unnecessary to elaborate on the classical framework for self-affirmation studies by incorporating into them implicit elements. Taken together with the non-significant effects of self-affirmation on intentions to consume fruit and vegetables in Epton and Harris's (2008) study, the results of the current study also suggest that self-affirmation might exert its effects on

the process of behaviour change by ways other than those postulated by the TPB (Ajzen, 1991; Conner & Sparks, 2005). Having said that, none of the alternative mechanisms of self-affirmation put forward in this study, namely expectancies, action control or perceived self-regulatory success, were promoted by self-affirmation. Of note, however, expectancies at the 7-day follow-up increased across the groups by 1.6 portions to reach 6.5 portions, which being 1.5 portions over the recommended guidelines suggests that the effects of self-affirmation on expectancies might have been subject to ceiling effects.

The current study did not find effects of self-affirmation on behaviour change, meaning that the study did not replicate Epton and Harris's (2008) findings of increased fruit and vegetable consumption following self-affirmation. However, at the 7-day follow-up, participants in both groups ate on average more fruit and vegetables than at baseline, with the statistically significant increase ($p < .001$) of 1.6 portions for daily consumption that amounted to around 5 portions of fruit and vegetables a day. These findings suggest the possibility that the health message on its own was a strong enough intervention to boost fruit and vegetable consumption to meet the recommended guidelines without leaving room for self-affirmation to have any additional effects. This might have been helped by the fact that all participants in the current study had taste preferences compatible with a diet rich in fruit and vegetables, as they passed the eligibility item aimed at identifying those with a dislike of common fruit and vegetables.

It might be suggested that the lack of the hypothesised effects of self-affirmation in the current study was due to a relative failure of the self-affirmation manipulation. This possibility might be entertained due to the use of a relatively new, insufficiently tried and tested means of self-affirmation (Sherman et al., 2009) and the fact that self-affirmed and non-affirmed participants indicated that they thought about their positive

aspects and values and felt good about themselves to a similar degree, thus, failing to pass several self-affirmation manipulation check items from Napper et al.'s (2009) research. Despite this, self-affirmed participants indicated that the task on values made them more aware of their personal aspects and values and considered their chosen value to be significantly more important than non-affirmed participants. Given that the development of self-affirmation manipulation checks is in its infancy, on balance, it is reasonable to assume that the self-affirmation manipulation worked as intended in the current study.

A related point to consider here would be a lack of differences between self-affirmed and non-affirmed participants on the previously postulated mediators of self-affirmation effects. In the current study, self-affirmed and non-affirmed groups showed similar feelings of positive affect and positive other-related affect, although the latter was found to differ in some previous research (e.g., Crocker et al., 2008). Similar to the manipulation checks, there is a lot yet to be discovered about the mechanisms of self-affirmation. However, a recent study by Armitage and Rowe (2011) has added to the idea that self-affirmation promotes positive other-related affect, such as positive interpersonal feelings, rather than positive self-related affect, such as global self-feelings and self-esteem, making positive other-related affect particularly worthy of further examination.

When interpreting the results of the current study it is important to recognise that it is subject to limited generalisability, as, in common with the majority of health-related self-affirmation studies, it relied on a sample consisting primarily of young females in tertiary education. Having said that, no differences were identified on the demographic characteristic between ineligible and eligible participants. Moreover, eligible participants who attended the laboratory session did not differ from those who did not

on the baseline fruit and vegetable consumption and the demographic variables other than gender. Female participants were more likely to attend the laboratory session, which is consistent with the trend of greater participation in health-related self-affirmation research on the part of females (Harris & Epton, 2009). Another limitation of the study is its reliance on self-report measures of fruit and vegetable consumption. This problem was partly attenuated by building a degree of redundancy into the study through the inclusion of two measures of fruit and vegetable consumption. Yet another limitation of the study is its short follow-up period, which, in the absence of an immediate necessity to initiate behaviour (e.g., the completion of a daily fruit and vegetable diary in Epton & Harris's, 2008, study), might not have been long enough to allow some participants to perform preparatory behaviours (e.g., buying fruit and vegetables). Additionally, short-term fruit and vegetable consumption is not sufficient to produce long-term health benefits, but it is, nonetheless, an indication of the possibility that long-term behaviour might ensue.

In conclusion, Study 1 showed no evidence of increased motivation to consume fruit and vegetables following self-affirmation on the measures of implicit motivation, explicit intentions or their related construct expectancies. Further, the explicit predictors of intentions postulated by the two-component TPB, as well as the self-regulatory processes and the actual fruit and vegetable consumption, were unaffected by self-affirmation. While the study did not produce statistically significant effects, the aspect of the study that looked into the impact of self-affirmation on implicit motivation was an interesting, reasoned venture into unexplored territory in the published self-affirmation literature on health. Conversely, the aspect of the study concerned with the effects of self-affirmation on the constructs from the two-component TPB is worth further investigation, given that intentions, its pivotal component, are among the more

supported constructs known to be influenced by self-affirmation (Harris & Epton, 2009)

and an indication that the effects of self-affirmation on the two-component TPB

constructs might have been subject to ceiling effects in the current study (e.g., at Time

1, mean scores on cognitive attitudes measured on a 7-point scale were 6.12 and 6.55

for non-affirmed and self-affirmed participants, respectively). A further inclusion of

constructs outside the classic and two-component TPB would also be justified, as there

is a possibility that the mechanisms of self-affirmation might not be captured by these

models of behaviour. Finally, given that the ultimate goal of self-affirmation research

into health behaviour change is its real-life application, the exploration of easier ways of

self-affirming and longer follow-up periods is also in order.

CHAPTER THREE

Study 2

Exploring the Effects of Self-Affirmation on the Quality of Intentions to Consume

Fruit and Vegetables

The search for potential motivational explanations for the relative failure of self-affirmation to produce health behaviour change is pursued further in the current study. The focus remains on intentions formed following self-affirmation, but the aspects of intentions that take centre stage have been shifted from implicit motivation to explicit intentions. In particular, Study 2 aims to investigate the effects of adding a self-affirmation manipulation to a persuasive health message on properties of intentions, such as their temporal stability and certainty, in addition to the properties of direction and strength. At the same time, addressing a need to simplify self-affirming procedures, a less demanding method of self-affirmation is introduced and examined together with the standard structured self-affirmation method and its control equivalent.

Quality of Intentions

The motivational stage of health behaviour change that culminates in the formation of intentions (Schwarzer, 1992) has been singled out by Harris and Epton (2010) as one of the points at which the effects of self-affirmation might dissipate. In particular, they raised the possibility that self-affirming might not result in the formation of genuine intentions, but rather ephemeral ones, which fade on encountering everyday obstacles. If intentions formed following self-affirmation are not connected to reality, the prospects of real-life application of health interventions involving self-affirmation will be dramatically undermined. Having said that, the findings by Epton and Harris (2008) of an actual health behaviour change following self-affirmation are an indication that intentions to enact behaviour spurred on by self-affirmation might be genuine. This

supposition, however, should be treated with caution, as, in Epton and Harris's (2008) study, while self-efficacy and response efficacy (some of the PMT predictors of intentions) were found to benefit from self-affirmation, intentions only evidenced an upward trend post self-affirmation but proved to be not significant ($p = .10$).

Properties of Intentions

One way to go beyond suppositions on the quality of intentions formed following self-affirmation would be to assess their properties. Among the intention properties that have been distinguished by Cooke and Sheeran (2013) some are routinely examined in self-affirmation research, such as direction (i.e., positive or negative valence) and intensity (i.e., acuteness), while others, such as accessibility (i.e., the degree of connectivity between mental representations of intentions and behaviour), temporal stability (i.e., the endurance of intentions over time) and certainty (i.e., the strength of conviction in the irrevocability of intentions) are in need of research attention. The accessibility of intentions formed following self-affirmation has been examined in Study 1 as implicit motivation, with no significant changes identified post self-affirmation. In the current study, therefore, the focus is placed on the two remaining lesser studied properties of intentions, namely their temporal stability and certainty.

The temporal stability of intentions has been deemed pivotal in moderating the cognition-behaviour relationship (Cooke & Sheeran, 2004) and it is the strongest predictor of intention-behaviour consistency among intention properties (Webb & Sheeran, 2006). Indeed, evidence that temporal stability of intentions is a significant moderator of the relationship between health-related intentions and behaviour has been steadily accumulating over the years from individual empirical studies. For example, the relationship between intentions to participate in medical screening and to maintain a

low-fat diet and their associated behaviours was found to be moderated by intention

stability, with stable and unstable intentions being strong and weak predictors of

behaviour, respectively, (Conner, Sheeran, Norman, & Armitage, 2000). These

individual findings have been given further weight by a meta-analysis of studies using a

range of health-related behaviours (general health maintenance, physical activity,

exercising, vigorous exercising, smoking cessation and condom use), which provided

evidence that the more stable the health-related intentions are, the more probable the

health-related behaviours are (Conner & Godin, 2007). Despite these findings, only one

self-affirmation study has touched upon temporal stability of intentions. Specifically,

Harris et al. (2007) found that self-affirmed smokers had greater smoking cessation

motivation than non-affirmed smokers, with the difference still being evident after 7

days. Importantly for the rationale of the current study, Harris et al.'s (2007) findings

serve as an indication that intentions formed following self-affirmation might be stable.

However, caution should be exercised when interpreting these findings due to the

study's reliance on a single general motivation item, rather than several intention items,

and a lack of statistical analyses commonly associated with tests of temporal stability

(e.g., within-participant Pearson correlation, Conner et al., 2000).

Inspired by previous research on the properties of attitudes (Bassili, 1996),

Cooke and Sheeran (2013) proposed to distinguish two dimensions in temporal stability

of intentions: operative and meta-judgemental. Operative stability is established by

statistically calculating a level of consistency between intention scores gathered at two

different time points; the health-related research that looked into this dimension of

temporal stability has been outlined above. Meta-stability refers to the subjective

assessment of the temporal stability of intentions reported by research participants (e.g.,

"How stable is your intention to exercise in the next 2 weeks?" [*very unstable* to *very*

stable], Cooke & Sheeran, 2013, p. 4). Cooke and Sheeran (2013) acknowledge that the predictive validity of measures of meta-stability of intentions is inferior to that of operative stability; nevertheless, given the importance of temporal stability as a moderator of the intention-behaviour relationship, it warrants the attention of self-affirmation researchers. Another meta-judgemental property of intentions distinguished by Cooke and Sheeran (2013) is certainty of intentions, which has been shown to moderate the intention-behaviour relationship in a conceptually similar way to operative stability of intentions. For example, Sheeran and Abraham (2003) found that as the certainty of exercise intentions (measured by the item "How certain is your intention to exercise at least four times in the next 2 weeks?" [*certain* to *uncertain*], p. 209) increased, so did the likelihood of exercising behaviour, which renders the examination of this property of intentions potentially informative of the quality of intentions formed following self-affirmation.

Cognition-Behaviour Mechanisms

In addition, as in Study 1, the current study aims to assess the effects of self-affirmation on the process of behaviour change postulated by the TPB. Where the studies differ, however, is that Study 1 investigated these effects by splitting the variables postulated by the classic TPB (Ajzen, 1991) as being the predictors of intentions into finer constructs, such as attitudes into cognitive and affective components (Conner & Sparks, 2005), whereas the current study does this by using an extended version of the classic TPB. The rationale behind this is Ajzen's (1991) suggestion that the TPB can be extended with other constructs, provided that they can account for additional significant variance in intentions or behaviour over and above that predicted by the usual TPB constructs. Among the constructs put forward, moral norm, which denotes how morally appropriate behaviour is perceived to be (Godin et

al., 2005), is postulated to have an effect on intentions alongside the usual TPB predictors of intentions (Ajzen, 1991; Beck & Ajzen, 1991). Indeed, across a range of studies, moral norm has been shown to account for an additional 4% of variance in intentions, after accounting for variance associated with attitudes, subjective norm and perceived behavioural control (Conner & Armitage, 1998). That moral norm might be affected by the act of self-affirming is suggested by the tenet of Self-Affirmation Theory that people aspire to be "morally adequate" (Steele, 1988, p. 262), the fact that health is generally held in high regard by them, and the suggestion that moral norm would have an impact on behaviours charged with moral weight (Ajzen 1991; Conner & Sparks, 2005). Currently, there is, however, a lack of empirical research on the effects of self-affirmation on moral norm but, given the reasoning above, it is hypothesised that self-affirmation should enhance it. That this can be of value in health promotion is suggested by Godin et al.'s (2005) findings that, provided that the targeted health behaviour was loaded with moral considerations, that is, with a sense of obligation to engage in the behaviour, its enactment was more likely when intentions were in line with moral norm (i.e., when a difference between intention and moral norm scores was less than that between intention and attitude scores) compared to when they were in line with attitudes (i.e., when a difference between intention and attitude scores was less than that between intention and moral norm scores).

An Alternative Self-Affirmation Method

To address one of the general limitations of self-affirmation research, specifically, the complexity of self-affirmation procedures (e.g., essay writing), the current study also investigated the effects of a simplified self-affirmation manipulation alongside the standard structured self-affirmation manipulation used in Study 1 (Sherman et al., 2009) on health-related cognitions and behaviour. The idea behind the

use of a simplified self-affirmation manipulation arose from the proposition that "in

principle any kind of thought can be self-affirming" (Armitage & Rowe, 2011, p. 543;

Harris & Epton, 2009), implying that there is no certain "dose" of self-affirmation

necessary to produce its usual effects and that shorter self-affirmation manipulations

might be as effective as longer ones. The research of Harris, Napper, Griffin, Schuez

and Stride (2011) on spontaneous self-affirmation, that is, the act of self-affirming in

everyday life on encountering threats to the self-concept, provided a foundation for the

development of a shorter self-affirmation manipulation. Harris et al. (2011) have shown

that people report spontaneously self-affirming by remembering things that they have

succeeded at, thinking about the things they value, and thinking about the people or

things important to them. These responses lend themselves well to the "then" part of

implementation intentions, or "if-then" plans, which specify how to behave when a

particular critical situation occurs (Gollwitzer, 1993). The critical situation is described

in the "if" part of the plan, two of which were derived from the usual self-affirmation

experimental paradigm and concerned seeing information people do not want to know

and finding their attention wandering from such information. A rationale behind this

hybrid manipulation is that, first, by analogy with classic implementation intention

plans, it should create a link between a critical situation and a response to it (Gollwitzer,

1999), with the latter being characterised by self-affirming properties. Second,

implementation intentions have been demonstrated to be successfully applied (with a

medium-sized effect) to the promotion of health-related behaviours (Gollwitzer &

Sheeran, 2006). For example, Chapman, Armitage and Norman (2009) found that

forming implementation intentions on how to increase fruit and vegetable consumption

resulted in enhanced consumption 7 days later.

The Current Study

Based on the foregoing discussion, Study 2 aimed to test the effects of self-affirmation on (a) measures of intentions and their properties, such as operative stability, meta-stability and certainty, as well as (b) potential mechanisms underlying these effects, such as moral norm, expectancies and self-regulatory processes, which might have been subject to ceiling effects in Study 1. Also, it aimed to probe (c) a simpler method of self-affirmation, by the inclusion of a hybrid of self-affirmation and implementation intention manipulations to extend the usual experimental paradigm for self-affirmation research. Fruit and vegetable consumption was retained as the context for the pursuit of these aims. However, in addition to the 7-day follow-up used in Study 1, the current study incorporated a 1-month follow-up to investigate whether any behaviour changes would be maintained, not only for the 7 days shown in previous research (Epton & Harris, 2008), but beyond, in recognition of the fact that short-term changes in eating behaviour are less likely to produce substantial health gains.

The current study started with participants reporting their baseline fruit and vegetable consumption before being randomised to the standard self-affirmation, implementation intention self-affirmation or non-affirmation tasks, reading a health message about fruit and vegetable consumption, completing measures of intentions, intention properties and expectancies (detailed in Study 1) related to fruit and vegetable consumption and, after 7 days and 1 month, completing these measures again, together with the measures of action control and perceived self-regulatory success related to fruit and vegetable consumption (detailed in Study 1) and actual fruit and vegetable consumption. It was hypothesised that (a) the effects of the two-types of self-affirmation manipulations would be equally effective, with self-affirmed participants showing (b) stronger intentions, (c) more positive but realistic expectancies, (d) stronger

feelings of action control, perceived self-regulatory success and moral norm, and (e) more fruit and vegetable consumption at 7-day and 1-month follow-ups. With regard to the properties of intentions, (f) operative stability of intentions was hypothesised to be sustained over time, but no predictions either way were made for meta-stability and certainty of intentions, as no hypotheses can be extrapolated from the existing empirical research or theory.

Method

Design

The study had a one-way, between-participants experimental design, with the manipulated independent variable of self-affirmation with three levels (non-affirmed, standard self-affirmed, implementation intention self-affirmed). Among the principal dependent variables were measures of intentions to consume fruit and vegetables, certainty and meta-stability of these intentions, expectancies and moral norm related to fruit and vegetable consumption, measures of action control and perceived self-regulatory success, and self-reported fruit and vegetable consumption taken after 7 days and 1 month.

Participants

Participants were recruited by email from a pool of research staff and graduate and undergraduate students to take part in a study of diet and health beliefs in exchange for being entered into a prize draw for £250 (4 awards of £25 and 3 awards of £50). Five hundred and eighty-nine willing participants were assessed for eligibility; of these 427 were found to be eligible. Among those eligible, 128 (30.0%) completed Time 1 measures and comprised the Time 1 sample. The sample had a mean age of 22.56 years ($SD = 4.83$, range 18-52 years) and consisted predominately of students (93.0%, $n = 119$), females (71.1%, $n = 91$), and people who described themselves as of white

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Caucasian origin (78.9%, $n = 101$)[11]. Of the Time 1 sample, $n = 100$ (78.1%) were

retained at Time 2, the 7-day follow-up, and $n = 65$ (50.8%) at Time 3, the 1-month

follow-up, (Figure 4).

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                        ┌─────────────────┐
                        │  Assessed for   │
                        │   Eligibility   │
                        │    N = 589      │
                        │   Ineligible    │
                        │    n = 162      │
                        └─────────────────┘
                                │          ┌──────────────────┐
                                ├──────────│   Lost to        │
                                │          │  Randomisation   │
                                │          │    n = 258       │
                                │          └──────────────────┘
                        ┌─────────────────┐
                        │  Randomised to  │
                        │   Condition     │
                        │    n = 169      │
                        └─────────────────┘
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	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed
Time 1	Analysed $n = 43$ Did not Complete $n = 9$	Analysed $n = 41$ Did not Complete $n = 22$	Analysed $n = 44$ Did not Complete $n = 10$
7 Days	Analysed $n = 34$ Lost to Follow-up $n = 9$	Analysed $n = 32$ Lost to Follow-up $n = 9$	Analysed $n = 34$ Lost to Follow-up $n = 10$
1 Month	Analysed $n = 22$ Lost to Follow-up $n = 12$	Analysed $n = 21$ Lost to Follow-up $n = 11$	Analysed $n = 22$ Lost to Follow-up $n = 12$

Figure 4. Participant flow through Study 2.

Materials

Pre-test measures. Pre-test measures included demographic questions about

sex, age and occupation, information about fruit and vegetable portion sizes, an

eligibility item and fruit and vegetable consumption measures. The eligibility item was

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[11] The remaining participants described themselves as of Asian (12.5%, $n = 16$), mixed (4.7%, $n = 6$) or other (3.9%, $n = 5$) ethnic origin.
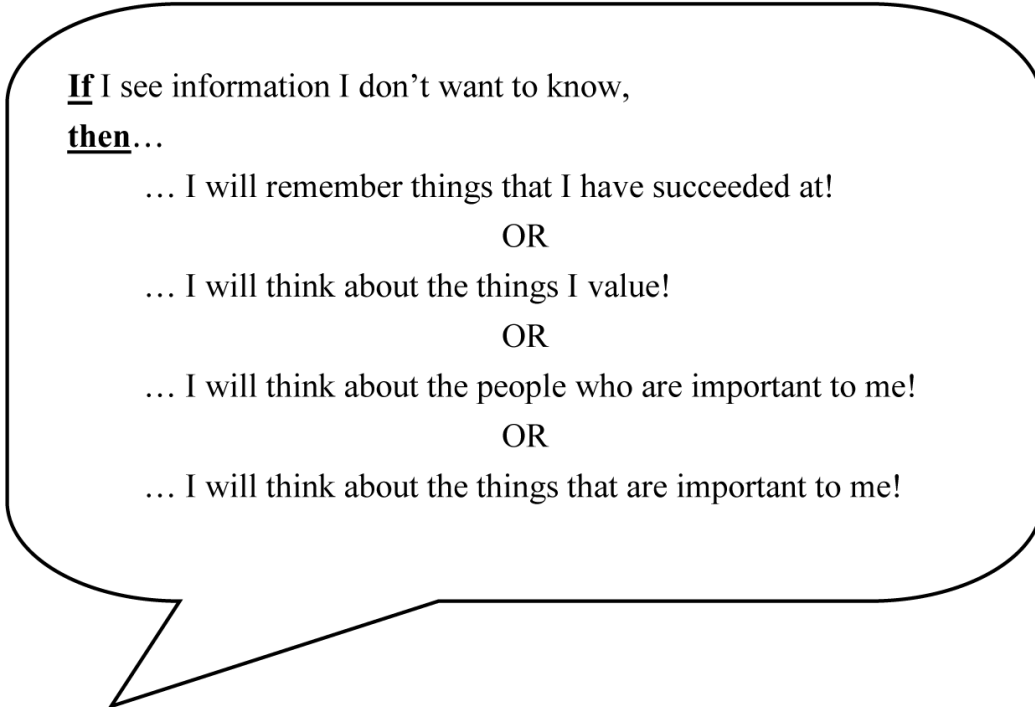
the "consumption eligibility item" adapted from Wiedemann et al. (2009) and detailed in Study 1. Measures of fruit and vegetable consumption included measures for a typical day, the last 24 hours and a typical week. The typical daily consumption measure was that developed by Steptoe et al. (2003) and detailed in Study 1. Consumption in the last 24 hours was measured by an adapted version of the vegetable, soup and fruit sections of the Cambridge Food Frequency Questionnaire (Bingham et al., 1994). This contained an extensive list of different types of fruit and vegetables and asked participants to select the number of portions (*none*; *1/4*; *1/2*; *1*; *2*; *3+*) they had eaten of each in the last 24 hours. A link to an online NHS leaflet providing pictorial examples of portions for some types of fruit and vegetables was included on each page and a space was provided at the end of the measure to record any fruit and vegetables consumed but not included in the list (e.g., pomegranate). During scoring, the category of "garlic" was excluded and fruit juice was counted only as one portion, regardless of how much participants drank (Appendix 2). Typical weekly consumption was assessed using the vegetable food section of the Eating Habits Questionnaire (Wardle et al., 2000) detailed in Study 1. After standardisation, the three measures of fruit and vegetable consumption had between them reasonably high internal reliability ($\alpha = .79$) and were combined into a single measure of baseline consumption before being log-transformed.

Self-affirmation manipulation. The standard self-affirmation and non-affirmation tasks were the same as those used in Study 1. The implementation intention self-affirmation task employed a layout used by Brown, Sheeran and Reuber (2009), which consisted of two thought bubbles with "example plans" and their corresponding partially completed "my plans". One plan was aimed at helping people to deal with situations in which they saw information they did not want to know. The other plan was

aimed at helping people to deal with situations in which they found their attention wandering from such information. Each plan offered participants four alternatives, identified by Harris et al. (2011) as active ingredients of self-affirmation, on how to deal with these situations: (1) remember things that they have succeeded at; (2) think about the things they value; (3) think about the people who are important to them; (4) think about the things that are important to them. Participants were asked to choose among these alternatives the one that represented how they would respond in the given situations and write it in the space provided (Figure 5).

EXAMPLE PLAN

If I see information I don't want to know,

then…

    … I will remember things that I have succeeded at!

        OR

    … I will think about the things I value!

        OR

    … I will think about the people who are important to me!

        OR

    … I will think about the things that are important to me!

MY PLAN

If I see information I don't want to know,

then (*write in what you will do in this situation*)!

Figure 5. Implementation intention self-affirmation task.

        Self-affirmation manipulation checks and potential mediators. The value importance self-affirmation manipulation check (Cerully, 2011, $\alpha = .98$) and measures of potential mediators, such as positive other-related affect (Crocker et al., 2008; $\alpha = .82$) and positive affect (Aarts & Dijksterhuis, 2003, $\alpha = .65$ improved to $\alpha = .72$ after the exclusion of one item) were the same as those used in Study 1. Additionally, a shortened thought-centred self-affirmation manipulation check (Napper et al., 2009) comprising three items ($\alpha = .84$), "The task on values made me think about...", *things I*

don't like about myself [1] - *things I like about myself* [7], *things I'm bad at* [1] - *things I'm good at* [7], *things I don't value about myself* [1] - *things I value about myself* [7], was used to retrospectively assess the success of the standard self-affirmation manipulation.

Health message. The health message was the same as that used in Study 1.

Principal dependent variables. *Intentions* were measured by three items (αs $\geq$ .97), "In the next month, I intend eating at least 5 portions of fruit and vegetables every day" (1, *strongly disagree*, 7, *strongly agree*), "In the next month, do you intend eating at least 5 portions of fruit and vegetables every day" (1, *definitely no*, 7, *definitely yes*), and "In the next month, I will try to eat at least 5 portions of fruit and vegetables every day" (1, *strongly disagree*, 7, *strongly agree*). *Certainty of intentions* was measured by two items (αs $\geq$ .79), "How definite is your intention (or lack of intention) to eat at least 5 portions of fruit and vegetables every day in the next month?" (1, *not at all definite*, 7, *extremely definite*) and "How certain are you about your intention (or lack of intention) to eat at least 5 portions of fruit and vegetables every day in the next month?" (1, *very uncertain*, 7, *very certain*). *Meta-stability of intentions* was measured by two items that were assessed separately due to low reliability (αs $\geq$ .01), "How stable is your intention to eat at least 5 portions of fruit and vegetables every day in the next month?" (1, *very unstable*, 7, *very stable*) and "How likely is it that your stated intention to eat at least 5 portions of fruit and vegetables every day in the next month will change?" (1, *very unlikely*, 7, *very likely*; scores recoded). *Expectancies* were measured by two items (adapted from Steptoe et al., 2003; αs $\geq$ .50) detailed in Study 1 that focused on the next month instead of 7 days. *Moral norm* was measured by three items (adapted from Godin et al., 2005; αs $\geq$ .88), "I would feel guilty about not eating at least 5 fruit and vegetables every day in the next month?" (1, *strongly disagree*, 7, *strongly agree*), "Not

eating at least 5 fruit and vegetables every day in the next month would go against my principles" (1, *strongly disagree*, 7, *strongly agree*), and "I feel obliged to eat at least 5 fruit and vegetables every day in the next month" (1, *strongly disagree*, 7, *strongly agree*).

Follow-up measures. The measures of fruit and vegetable consumption (αs $\geq$ .68), intentions, properties of intentions and moral norm were taken again after 7 days and 1 month. Additionally, the follow-up measures included measures of retrospective action control and perceived self-regulatory success. Six *action control* items (adapted from Sniehotta et al.'s, 2006, study; αs $\geq$ .96) were those used in Study 1 but rewritten in the past tense. Three *perceived self-regulatory success* items (adapted from Fishbach et al.'s, 2003, Study 4; αs $\geq$ .65 improved to αs $\geq$ .76 after the exclusion of the last item) were those used in Study 1.

Procedure

The study was run online and started with the pre-test measures, which included demographic questions before proceeding to the information about portion sizes for fruit and vegetables and the consumption eligibility item. At this stage, those indicating that at the time they ate at least 5 portions of fruit and vegetables on a typical day and found it easy to do so were thanked for volunteering but did not proceed further. The remaining participants were asked to fill in the three measures of fruit and vegetable consumption, provided with information about the study and asked to give informed consent for participation. Participants consenting to participate were provided with a link to the main set of measures, where they were randomly assigned to complete either the standard self-affirmation, implementation intention self-affirmation or non-affirmation tasks. After working on their assigned task and completing measures of positive other-related affect, positive affect and, for non-affirmed and standard self-

affirmed groups only, the importance of chosen value measure, participants read the

health message. This was followed by measures of the principal dependent variables.

After 7 days and 1 month, participants completed the follow-up measures online. These

concluded with a funnel debriefing procedure (Chartrand & Bargh, 1996).

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Results

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Preliminary Checks

There were no differences between ineligible ($n = 162$) and eligible ($n = 427$)

participants in occupation (collapsed into categories of "not student" and "student" to

meet the requirement for the expected cell count), $\chi^2(1, N = 589) = 0.11$, $p = .744$, but

ineligible participants were on average 2.37 years older, $F(1, 587) = 20.85$, $p < .001$, ηp^2

$= .034$, and were more likely to be female, $\chi^2(1, N = 589) = 10.61$, $p = .001$, (Table 16).

Table 16.
Characteristics of Ineligible and Eligible Participants

Variable		Ineligible	Eligible	Full Sample
		$n = 162$	$n = 427$	$N = 589$
Age				
	M	24.48	22.11	22.76
	SD	(7.56)	(4.69)	(5.72)
Sex				
	Male	32	143	175
	Female	130	284	414
Occupation				
	Not student	8	24	32
	Student	154	403	557

Eligible participants who followed the link to the Time 1 measures ($n = 169$) did

not differ from those who did not ($n = 258$) in age, $F(1, 425) < 1$, occupation (collapsed

as above), $\chi^2(1, N = 427) = 0.05$, $p = .830$, or on the baseline measure of fruit and

vegetable consumption, $F(1, 354) < 1$, but those who followed the link were more likely

to be female, $\chi^2(1, N = 427) = 4.05$, $p = .044$, (Table 17).

Table 17.

Characteristics of Participants Who Did Not Follow and Followed a Link to Time 1 Measures

Variable	Did not Follow Link	Followed Link	Full Sample
	$n = 258$	$n = 169$	$N = 427$
Age			
M	21.97	22.34	22.11
SD	(4.71)	(4.66)	(4.69)
Sex			
Male	96	47	143
Female	162	122	284
Occupation			
Not student	14	10	24
Student	244	159	403
	$n = 187^b$	$n = 169$	$N = 356$
Baseline consumption (z scores)[a]	0.59	0.59	0.59
	(0.08)	(0.09)	(0.09)

Note. Unless specified, means with standard deviations in parentheses. [a]Scores were log-transformed to reduce the impact of outliers. [b]The drop in *n* is due to missing data.

Participants who completed Time 1 measures ($n = 128$) did not differ from participants who started but did not complete Time 1 measures ($n = 41$) in age, $F(1, 167) = 1.24$, $p = .268$, $\eta p^2 = .007$, sex, $\chi^2(1, N = 169) = 0.32$, $p = .574$, occupation (collapsed as above), $\chi^2(1, N = 169) = 1.18$, $p = .278$, or on the baseline measure of fruit and vegetable consumption, $F(1, 167) = 1.10$, $p = .295$, $\eta p^2 = .007$, (Table 18).

Table 18.

Characteristics of Eligible Participants Who Did not Complete and Completed Time 1 Measures

Variable	Did Not Complete Time 1	Completed Time 1	Full Sample
	n = 41	*n* = 128	*N* = 169
Age	21.63	22.56	22.34
	(4.06)	(4.83)	(4.66)
Sex			
Male	10	37	47
Female	31	91	122
Occupation			
Not student	1	9	10
Student	40	119	159
Baseline consumption (z scores)[a]	0.60	0.59	0.59
	(0.08)	(0.09)	(0.09)

Note. Unless specified, means with standard deviations in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

There were no differences between participants who completed only Time 1 measures (*n* = 63) and those who completed measures at all three time points (*n* = 65) in age, $F(1, 126) = 1.89$, $p = .171$, $\eta p^2 = .015$, sex, $\chi^2(1, N = 128) = 0.49$, $p = .485$, occupation (collapsed as above), $\chi^2(1, N = 128) = 0.98$, $p = .323$, or on the baseline measure of fruit and vegetable consumption, $F(1, 126) = 1.27$, $p = .261$, $\eta p^2 = .010$, (Table 19).

Table 19.

Characteristics of Eligible Participants Who Completed Time 1 Only and Time 1, 2 and 3 Measures

Variable	Completed Time 1 Only	Completed Time 1, 2, 3	Full Sample
	$n = 63$	$n = 65$	$N = 128$
Age	21.97	23.14	22.56
	(3.66)	(5.71)	(4.83)
Sex			
Male	20	17	37
Female	43	48	91
Occupation			
Not student	3	6	9
Student	60	59	119
Baseline consumption (z scores)[a]	0.58	0.60	0.58
	(0.09)	(0.09)	(0.09)

Note. Unless specified, means with standard deviations in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

Randomisation Check

To determine the success of the randomisation procedure, a Pearson Chi-square analysis was run on sex and one-way between-participants ANOVAs with the independent variable of self-affirmation (non-affirmed, standard self-affirmed, implementation intention self-affirmed) were run on age and the baseline measure of fruit and vegetable consumption for the Time 1 sample. No differences were found between any of the conditions in sex, $\chi^2(2, N = 128) = 0.40$, $p = .820$, age, $F(2, 125) = 1.16$, $p = .318$, $\eta p^2 = .018$, or on the baseline measure of fruit and vegetable consumption, $F(2, 125) < 1$, suggesting that randomisation to conditions was successful (Table 20).

Table 20.
Baseline Sample Characteristics

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
	$n = 43$	$n = 41$	$n = 44$	$N = 128$
Age	21.67	23.20	22.84	22.56
	(3.42)	(6.32)	(4.36)	(4.83)
Sex				
Male	11	13	13	37
Female	32	28	31	91
Baseline consumption (z scores)[a]	0.59 (0.08)	0.57 (0.10)	0.60 (0.08)	0.59 (0.09)

Note. Unless specified, means with standard deviations in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

Self-Affirmation Manipulation Checks and Potential Mediators

A one-way ANOVA, with the independent variable of self-affirmation (non-affirmed, standard self-affirmed), found that there was a significant main effect of self-affirmation condition on value importance, $F(1, 82) = 115.14$, $p < .001$, $\eta p^2 = .584$, with non-affirmed participants indicating that the value they wrote about was less important to them compared to standard self-affirmed participants. However, using a one-way ANOVA, with the independent variable of self-affirmation (non-affirmed, standard self-affirmed, implementation intention self-affirmed), there were no differences between conditions on the retrospective thought-centred self-affirmation manipulation check, $F(2,125) = 1.60$, $p = .206$, $\eta p^2 = .025$, (Table 21). In the funnel debriefing procedure no participant showed awareness of a link between self-affirmation manipulation and their responses to the dependent measures.

Table 21.
Means and Standard Deviations for Scores on the Measures of Self-Affirmation Manipulation Checks

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
Self-affirmation manipulation checks				
	$n = 43$	$n = 41$	N/A	$N = 84$
Value importance	3.32	6.35	N/A	4.80
	(1.62)	(0.82)		(1.99)
	$n = 43$	$n = 41$	$n = 44$	$N = 128$
Thought-centred	4.13	4.50	4.01	4.21
	(1.07)	(1.40)	(1.41)	(1.31)

Note. Standard deviations are in parentheses.

The two potential mediators, positive other-related affect and positive affect, were significantly positively correlated, $r(128) = .60$, $p < .001$, indicating that it was appropriate to analyse these variables in a MANOVA. Using a one-way MANOVA (Wilk's Lambda), with the independent variable of self-affirmation (non-affirmed, standard self-affirmed, implementation intention self-affirmed) and two continuous dependent variables of positive other-related affect and positive affect, there was no significant multivariate main effect of self-affirmation on the potential mediators, $F(4, 248) < 1$. Participants across the groups had moderate scores on these variables (Table 22).

Table 22.
Means and Standard Deviations for Scores on Potential Mediators

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
Potential mediators				
	$n = 43$	$n = 41$	$n = 44$	$N = 128$
Positive other-related affect	3.23	3.14	3.33	3.23
	(0.80)	(0.81)	(0.80)	(0.80)
Positive affect	4.09	3.89	4.08	4.03
	(1.07)	(1.35)	(1.04)	(1.15)

Note. Standard deviations are in parentheses.

Behaviour

Differences on the combined measure of fruit and vegetable consumption at Time 2 and 3 were first analysed separately in exploratory analyses using a one-way, between-participants ANCOVA, with the between-participants independent variable of self-affirmation (non-affirmed, standard self-affirmed, implementation intention self-affirmed) and the baseline measure of fruit and vegetable consumption entered as a covariate. Next, a longitudinal analysis was run on data for participants who completed measures at the three time points. These data were analysed in a two-way ANCOVA for mixed designs, with the between-participants independent variable of self-affirmation (non-affirmed, standard self-affirmed, implementation intention self-affirmed), the within-participants independent variable of time (time 2, time 3), and the baseline measure of fruit and vegetable consumption entered as a covariate. Finally, an intention-to-treat analysis was run, in which missing Time 2 and 3 data for participants who were randomised to the conditions but dropped out from the study was imputed using the standardised mean baseline fruit and vegetable consumption ($M = -0.076$), which was log-transformed in line with the other analyses of behaviour. A two-way ANCOVA for mixed designs was rerun on these data.

In the exploratory analyses, the regression of the baseline measure of fruit and vegetable consumption on its Time 2 and 3 counterparts was statistically significant ($p < .001$), indicating that it was appropriate to introduce the covariates into the analyses. There was no main effect of self-affirmation on the measure of fruit and vegetable consumption at Time 2, $F(2, 96) = 1.84$, $p = .164$, $\eta p^2 = .037$, with participants across the groups reporting similar consumption. The main effect of self-affirmation on the measure of fruit and vegetable consumption at Time 3 was, however, significant, $F(2, 61) = 4.71$, $p = .013$, $\eta p^2 = .134$, (Table 23). Planned comparisons (adjusted to a

significance level of $p = .017$ to control for inflated alpha) revealed that the scores of the non-affirmed group did not differ significantly from those of the standard self-affirmed, $F(1, 40) = 3.23$, $p = .080$, $\eta p^2 = .075$, or the implementation intention self-affirmed, $F(1, 41) = 1.77$, $p = .191$, $\eta p^2 = .041$, groups. However, the difference between the scores of the standard self-affirmed and the implementation intention self-affirmed groups was significant, $F(1, 40) = 10.24$, $p = .003$, $\eta p^2 = .204$.

Table 23.
Means and Standard Deviations for Scores on Fruit and Vegetable Consumption at Time 2 and 3

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
Consumption (z scores)[a]				
	$n = 32$	$n = 34$	$n = 34$	$N = 100$
Time 2	0.59	0.61	0.59	0.60
	(0.08)	(0.09)	(0.08)	(0.08)
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Time 3	0.59	0.63	0.58	0.60
	(0.09)	(0.07)	(0.08)	(0.09)

Note. Standard deviations are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

In the longitudinal analysis, the regression of the baseline fruit and vegetable consumption measure on its longitudinal counterpart was statistically significant ($p < .001$). There was a significant main effect of self-affirmation on fruit and vegetable consumption, $F(2, 61) = 4.83$, $p = .011$, $\eta p^2 = .137$, (Table 24). Planned comparisons ($p = .017$) revealed that the scores of the non-affirmed group did not differ significantly from those of the standard self-affirmed, $F(1, 40) = 3.32$, $p = .076$, $\eta p^2 = .077$, or the implementation intention self-affirmed, $F(1, 41) = 2.09$, $p = .156$, $\eta p^2 = .048$, groups. However, the difference between the scores of the standard self-affirmed and the implementation intention self-affirmed groups was significant, $F(1, 40) = 9.05$, $p = .005$, $\eta p^2 = .184$. There was no significant main effect of time, $F(1, 61) = 1.33$, $p =$

.253, $\eta p^2 = .021$ ($M_{TIME2} = 0.59$, $SD = 0.01$; $M_{TIME3} = 0.60$, $SD = 0.01$), nor significant

interaction effects involving self-affirmation and time, all F's < 1.

Table 24.

Adjusted Means and Standard Errors for Scores on Fruit and Vegetable Consumption Averaged for Time 2 and 3

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Consumption (z scores)[a]	0.59 (0.01)	0.63 (0.01)	0.57 (0.01)	0.60 (0.01)

Note. Standard errors are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

In the intention-to-treat analysis, the regression of the baseline fruit and

vegetable consumption measure on its intention-to-treat counterpart was statistically

significant ($p < .001$). There was no main effect of self-affirmation on fruit and

vegetable consumption, $F(2, 165) = 1.76$, $p = .175$, $\eta p^2 = .021$, with participants across

the groups consuming similar amounts of fruit and vegetables, (Table 25). However,

there was a significant main effect of time on fruit and vegetable consumption, $F(1, 165) = 6.62$, $p = .011$, $\eta p^2 = .039$ ($M_{TIME2} = 0.59$, $SD = 0.00$; $M_{TIME3} = 0.60$, $SD = 0.00$),

with participants consuming more fruit and vegetables at Time 3 than Time 2. The

interaction between time and self-affirmation was not significant, $F(2, 165) < 1$.

Table 25.

Adjusted Means and Standard Errors for Intention-to-Treat Scores on Fruit and Vegetable Consumption Averaged for Time 2 and 3

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
	$n = 52$	$n = 63$	$n = 54$	$N = 169$
Consumption (z scores)[a]	0.59 (0.01)	0.60 (0.01)	0.59 (0.01)	0.59 (0.01)

Note. Standard errors are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

Predictors of Behaviour

Data on cognitions were analysed separately in exploratory analyses using a one-way, between-participants ANOVA, with the independent variable of self-affirmation (non-affirmed, standard self-affirmed, implementation intention self-affirmed). Additionally, longitudinal analyses were run on data from participants who completed measures at all three time points. These were analysed in a two-way ANOVA for mixed designs, with the between-participants independent variable of self-affirmation (non-affirmed, standard self-affirmed, implementation intention self-affirmed) and the within-participants independent variable of time (time 1, time 2, time 3). Given that in the current study a drop in participant numbers at Time 2 and 3 rendered the longitudinal analyses less powerful than the exploratory analyses, the outcomes of the former on the between-participants independent variable (self-affirmation) are reported only for dependent variables with significant effects in the exploratory analyses, with outcomes on the within-participant variable (time) reported throughout.

Intentions and expectancies. In the exploratory analyses, there was no main effect of self-affirmation on either intentions at Time 1, $F(2, 125) = 1.83$, $p = .165$, $\eta p^2 = .028$, Time 2, $F(2, 97) = 1.49$, $p = .231$, $\eta p^2 = .030$, or Time 3, $F(2, 62) = 1.55$, $p = .221$, $\eta p^2 = .048$, nor on expectancies at Time 1, $F(2, 125) < 1$, Time 2, $F(2, 97) < 1$, or Time 3, $F(2, 62) = 1.00$, $p = .373$, $\eta p^2 = .031$. At all three time points, participants across the groups had moderately high to high scores on intentions (Table 26).[12]

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[12] The log-transformation of scores on expectancies prevented commenting on their magnitude. However, raw scores on expectancies suggested that non-affirmed (Time 1: $M = 5.07$, $SD = 1.75$; Time 2: $M = 5.66$, $SD = 2.18$; Time 3: $M = 5.86$, $SD = 2.64$), standard self-affirmed (Time 1: $M = 5.11$, $SD = 3.18$; Time 2: $M = 5.48$, $SD = 2.04$; Time 3: $M = 5.52$, $SD = 2.81$) and implementation intention self-affirmed (Time 1: $M = 4.99$, $SD = 1.71$; Time 2: $M = 5.01$, $SD = 1.96$; Time 3: $M = 4.61$, $SD = 1.45$) participants expected to eat either around or more than 5 portions of fruit and vegetables every day in the next 1 month at Time 1, 2 and 3.

Table 26.

Means and Standard Deviations for Scores on Intentions and Expectancies at Time 1, 2 and 3

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
Intentions				
	$n = 43$	$n = 41$	$n = 44$	$N = 128$
Time 1	5.63	4.98	5.26	5.29
	(1.11)	(1.86)	(1.61)	(1.56)
	$n = 34$	$n = 32$	$n = 34$	$N = 100$
Time 2	5.47	4.75	4.83	5.02
	(1.50)	(2.14)	(1.94)	(1.88)
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Time 3	5.55	4.57	4.61	4.92
	(1.80)	(2.33)	(2.05)	(2.08)
Expectancies[a]				
	$n = 43$	$n = 41$	$n = 44$	$N = 128$
Time 1	0.60	0.59	0.59	0.59
	(0.08)	(0.13)	(0.08)	(0.10)
	$n = 34$	$n = 32$	$n = 34$	$N = 100$
Time 2	0.60	0.60	0.57	0.59
	(0.11)	(0.10)	(0.10)	(0.11)
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Time 3	0.61	0.60	0.57	0.59
	(0.13)	(0.13)	(0.08)	(0.11)

Note. Standard deviations are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

In the longitudinal analyses, there was a significant main effect of time on intentions, $F(2, 124) = 4.10$, $p = .019$, $\eta p^2 = .062$ ($M_{TIME1} = 5.26$, $SD = 0.21$; $M_{TIME2} = 4.98$, $SD = 0.24$; $M_{TIME3} = 4.91$, $SD = 0.26$). Planned comparisons ($p = .017$) revealed that intention scores at Time 1 were significantly higher than those at Time 2, $F(1, 99) = 5.91$, $p = .017$, $\eta p^2 = .056$, and Time 3, $F(1, 70) = 7.31$, $p = .009$, $\eta p^2 = .095$, but the difference between the scores at Time 2 and 3 was not significant, $F(1, 64) < 1$. There was no significant main effect of time on expectancies, $F(2, 124) = 1.51$, $p = .226$, $\eta p^2 = .024$ ($M_{TIME1} = 0.58$, $SD = 0.01$; $M_{TIME2} = 0.58$, $SD = 0.01$; $M_{TIME3} = 0.59$, $SD = 0.01$). Nor were there significant interaction effects involving self-affirmation and time on either intentions, $F(4, 124) < 1$, or expectancies, $F(4, 124) = 1.35$, $p = .254$, $\eta p^2 = .042$.

To test whether intentions formed following self-affirmation were operatively stable, scores on the three intention items taken at Time 1 and 2 were summed within these time points and then subtracted from their corresponding intention scores at Time 2 and 3, respectively, following procedures described by Conner and Godin (2007). For the purposes of aiding interpretation, the sign of the resultant difference scores was then reversed, meaning that more operatively stable intentions corresponded to higher scores (Conner & Godin, 2007). The difference scores were then subjected to a one-way, between-participants ANOVA, with the independent variable of self-affirmation (non-affirmed, standard self-affirmed, implementation intention self-affirmed). There was no main effect of self-affirmation on either operative stability of intentions at Time 2, $F(2, 97) = 1.36$, $p = .261$, $\eta p^2 = .027$, or Time 3, $F(2, 62) < 1$. At the two time points, participants across the groups had intention scores that were similar in their degree of operative stability (Table 27).

Table 27.
Means and Standard Deviations for Difference Scores Representing Operative Stability of Intentions at Time 2 and 3

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
Difference scores				
	$n = 34$	$n = 32$	$n = 34$	$N = 100$
Time 2	0.26	1.47	0.56	0.76
	(2.61)	(3.82)	(2.70)	(3.04)
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Time 3	0.05	0.19	0.50	0.25
	(2.63)	(3.80)	(2.44)	(2.96)

Note. Standard deviations are in parentheses.

To test whether self-affirmation affected the extent to which expectancies were more or less realistic, scores on the typical daily fruit and vegetable consumption at Time 2 and 3 were subtracted from scores on the expectancies about typical daily fruit and vegetable consumption at Time 1 and 2, respectively, meaning that optimistic

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expectancies corresponded to positive scores. Using one-sample t-tests, the means for non-affirmed, $t = 0.16$, $df = 33$, $p = .878$, standard self-affirmed, $t = 0.67$, $df = 31$, $p = .506$, and implementation intention self-affirmed, $t = 1.86$, $df = 33$, $p = .071$, participants did not differ significantly from zero for the Time 1 expectancies-Time 2 consumption difference. Similarly, the means for non-affirmed, $t = 0.23$, $df = 21$, $p = .817$, and standard self-affirmed, $t = 0.74$, $df = 20$, $p = .468$, participants did not differ significantly from zero for the Time 2 expectancies-Time 3 consumption difference, but that for implementation intention self-affirmed participants did, $t = 2.77$, $df = 21$, $p = .011$, (Table 28). These results suggested that apart from the implementation intention self-affirmed participants, who at Time 2 had pessimistic expectancies about their subsequent fruit and vegetable consumption, all the remaining participants had expectancies about their future fruit and vegetable consumption that proved realistic.

Table 28.
Means and Standard Deviations for Difference Scores Representing Optimism of Expectancies at Time 1 and 2

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
Difference scores[a]				
	$n = 34$	$n = 32$	$n = 34$	$N = 100$
Time 1	-0.00	-0.01	0.02	0.00
	(0.09)	(0.09)	(0.08)	(0.09)
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Time 2	-0.01	-0.01	-0.04	-0.02
	(0.12)	(0.07)	(0.06)	(0.08)

Note. Standard deviations are in parentheses. [a]Scores of the minuend and subtrahend were log-transformed to reduce the impact of outliers.

Certainty and meta-stability of intentions. In the exploratory analyses, there were no main effects of self-affirmation on certainty of intentions at Time 1, $F(2, 125) < 1$, Time 2, $F(2, 97) < 1$, or Time 3, $F(2, 62) < 1$, meta-stability of intentions item 1 at Time 1, $F(2, 125) = 2.48$, $p = .087$, $\eta p^2 = .038$, Time 2, $F(2, 97) = 1.23$, $p = .296$, $\eta p^2 = .025$, or Time 3, $F(2, 62) < 1$, or meta-stability of intentions item 2 at Time 1, $F(2, 125)$

= 1.04, $p = .355$, $\eta p^2 = .016$, or Time 3, $F(2, 62) < 1$, with scores being moderately high

to high across the groups. However, there was a significant main effect of self-

affirmation on meta-stability of intentions item 2 at Time 2, $F(2, 97) = 3.31$, $p = .041$,

$\eta p^2 = .064$, (Table 29). Planned comparisons ($p = .017$) revealed that the scores of the

non-affirmed group did not differ significantly from those of the standard self-affirmed

group, $F(1, 64) < 1$, and the scores of the standard self-affirmed group did not differ

significantly from those of the implementation intention self-affirmed group, $F(1, 64) =$

4.05, $p = .048$, $\eta p^2 = .060$. However, the difference between the scores of the non-

affirmed and the implementation intention self-affirmed groups was significant, $F(1, 66)$

= 6.66, $p = .012$, $\eta p^2 = .092$, with the scores of the implementation intention self-

affirmed group being higher than those of the non-affirmed group.

Table 29.

Means and Standard Deviations for Scores on Certainty and Meta-Stability of Intentions at Time 1, 2 and 3

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
Certainty of intentions				
	$n = 43$	$n = 41$	$n = 44$	$N = 128$
Time 1	5.37	5.20	5.43	5.34
	(1.16)	(1.70)	(1.22)	(1.36)
	$n = 34$	$n = 32$	$n = 34$	$N = 100$
Time 2	5.22	5.30	5.29	5.27
	(1.27)	(1.68)	(1.24)	(1.39)
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Time 3	5.59	5.62	5.30	5.50
	(1.52)	(1.29)	(1.33)	(1.38)
Meta stability of intentions item 1				
	$n = 43$	$n = 41$	$n = 44$	$N = 128$
Time 1	5.30	4.73	5.41	5.16
	(1.19)	(1.86)	(1.39)	(1.51)
	$n = 34$	$n = 32$	$n = 34$	$N = 100$
Time 2	4.88	4.69	5.32	4.97
	(1.74)	(1.96)	(1.34)	(1.70)
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Time 3	5.18	5.33	5.50	5.34
	(1.71)	(1.62)	(1.37)	(1.55)
Meta stability of intentions item 2				
	$n = 43$	$n = 41$	$n = 44$	$N = 128$
Time 1	4.00	4.29	4.61	4.30
	(1.86)	(2.19)	(1.88)	(1.98)
	$n = 34$	$n = 32$	$n = 34$	$N = 100$
Time 2	4.24	4.41	5.32	4.66
	(1.91)	(2.12)	(1.55)	(1.91)
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Time 3	4.59	4.81	5.18	4.86
	(2.22)	(2.02)	(1.50)	(1.92)

Note. Standard deviations are in parentheses.

In the longitudinal analyses, there was no main effect of self-affirmation on meta-stability of intentions item 2, $F(2, 62) = 2.52$, $p = .089$, $\eta p^2 = .075$, with participants across the groups having similar moderately high to high scores (Table 30). There were no main effects of time on certainty of intentions, $F(2, 124) < 1$ ($M_{TIME1} = 5.44$, $SD = 0.16$; $M_{TIME2} = 5.29$, $SD = 0.18$; $M_{TIME3} = 5.50$, $SD = 0.17$), or meta-stability

of intentions item 2, $F(2, 124) < 1$ ($M_{TIME1} = 4.72$, $SD = 0.22$; $M_{TIME2} = 4.86$, $SD = 0.24$; $M_{TIME3} = 4.86$, $SD = 0.24$), with participants having similar moderately high to high scores across the three time points. However, there was a significant main effect of time on meta-stability of intentions item 1, $F(2, 124) = 3.17$, $p = .045$, $\eta p^2 = .049$ ($M_{TIME1} = 5.26$, $SD = 0.20$; $M_{TIME2} = 4.92$, $SD = 0.22$; $M_{TIME3} = 5.34$, $SD = 0.20$). Planned comparisons ($p = .017$) revealed that the scores for meta-stability of intentions item 1 at Time 1 did not differ significantly from those at Time 2, $F(1, 62) = 3.66$, $p = .060$, $\eta p^2 = .056$, or Time 3, $F(1, 62) < 1$. Nor was the difference between the scores at Time 2 and 3 significant, $F(1, 62) = 4.45$, $p = .039$, $\eta p^2 = .067$.

Table 30.
Adjusted Means and Standard Errors for Scores on Meta-Stability of Intentions Item 2 Averaged for Time 2 and 3

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Meta stability of intentions item 2	4.38 (0.32)	4.68 (0.33)	5.38 (0.32)	4.81 (0.32)

Note. Standard errors are in parentheses.

Predictors of Intentions

Moral norm. In the exploratory analyses, there were no main effects of self-affirmation on moral norm at Time 1, $F(2, 125) = 2.32$, $p = .103$, $\eta p^2 = .036$, with participants across the groups having similar moderately low scores. However, there were significant main effects of self-affirmation on moral norm at Time 2, $F(2, 97) = 7.20$, $p = .001$, $\eta p^2 = .129$, and Time 3, $F(2, 62) = 7.43$, $p = .001$, $\eta p^2 = .193$. Planned comparisons ($p = .017$) revealed that at both time points the non-affirmed group had significantly higher scores than the standard self-affirmed, Time 2 $F(1, 64) = 8.98$, $p = .004$, $\eta p^2 = .123$ and Time 3 $F(1, 41) = 9.91$, $p = .003$, $\eta p^2 = .195$, and the implementation intention self-affirmed, Time 2 $F(1, 66) = 13.29$, $p = .001$, $\eta p^2 = .168$

and Time 3 $F(1, 42) = 11.47$, $p = .002$, $\eta p^2 = .215$, groups. The difference between the standard self-affirmed and the implementation intention self-affirmed groups was not significant, Time 2 $F(1, 64) < 1$ and Time 3 $F(1, 41) < 1$, (Table 31).

Table 31.
Means and Standard Deviations for Scores on Moral Norm at Time 1, 2 and 3

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
Moral norm				
	$n = 43$	$n = 41$	$n = 44$	$N = 128$
Time 1	3.77	3.15	3.13	3.35
	(1.36)	(1.75)	(1.54)	(1.57)
	$n = 34$	$n = 32$	$n = 34$	$N = 100$
Time 2	4.29	3.16	2.94	3.47
	(1.41)	(1.67)	(1.64)	(1.67)
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Time 3	4.26	2.65	2.62	3.18
	(1.73)	(1.61)	(1.46)	(1.76)

Note. Standard deviations are in parentheses.

In the longitudinal analysis, there was a significant main effect of self-affirmation on moral norm, $F(2, 62) = 5.05$, $p = .009$, $\eta p^2 = .140$, (Table 32). Planned comparisons ($p = .017$) revealed that the scores of the non-affirmed group differed significantly from those of the standard self-affirmed, $F(1, 41) = 6.40$, $p = .015$, $\eta p^2 = .135$, and the implementation intention self-affirmed, $F(1, 42) = 8.80$, $p = .005$, $\eta p^2 = .173$, groups. The difference between the scores of the standard self-affirmed and the implementation intention self-affirmed groups was not significant, $F(1, 41) < 1$. The main effect of time was not significant, $F(2, 124) = 1.52$, $p = .223$, $\eta p^2 = .024$ ($M_{TIME1} = 3.20$, $SD = 0.20$; $M_{TIME2} = 3.37$, $SD = 0.20$; $M_{TIME3} = 3.18$, $SD = 0.20$), with scores being moderately low across the three time points. The significant main effect of self-affirmation was qualified by a significant interaction between time and self-affirmation, $F(4, 124) = 2.65$, $p = .036$, $\eta p^2 = .079$. The interaction was decomposed, first, by looking at the effect of self-affirmation on moral norm at Time 1, 2 and 3, detailed in

the exploratory analyses above as the main effects of self-affirmation on moral norm and their associated planned comparisons. To reiterate, the only significant differences in the scores on moral norm were between the non-affirmed group and both standard self-affirmed and implementation intention self-affirmed groups at Time 2 and 3. Second, by looking at the effect of time within each level of the self-affirmation independent variable. There was a significant difference between the scores on moral norm at Time 1, 2 and 3 within the non-affirmed group, $F(2, 42) = 3.48$, $p = .040$, $\eta p^2 = .142$ ($M_{TIME1} = 3.76$, $SD = 1.53$; $M_{TIME2} = 4.24$, $SD = 1.59$; $M_{TIME3} = 4.26$, $SD = 1.73$). However, planned comparisons ($p = .017$) revealed that the scores on moral norm at Time 1 did not differ significantly from those at Time 2, $F(1, 21) = 4.58$, $p = .044$, $\eta p^2 = .179$, or Time 3, $F(1, 21) = 3.77$, $p = .066$, $\eta p^2 = .152$. Nor was the difference between the scores at Time 2 and 3 significant, $F(1, 21) < 1$. There were no significant differences on the scores on moral norm at Time 1, 2 and 3 within the standard self-affirmed group, $F(2, 40) = 2.03$, $p = .144$, $\eta p^2 = .092$ ($M_{TIME1} = 3.06$, $SD = 1.85$; $M_{TIME2} = 2.92$, $SD = 1.67$; $M_{TIME3} = 2.65$, $SD = 1.61$), or implementation intention self-affirmed group, $F(2, 42) = 1.26$, $p = .295$, $\eta p^2 = .057$ ($M_{TIME1} = 2.79$, $SD = 1.46$; $M_{TIME2} = 2.95$, $SD = 1.58$; $M_{TIME3} = 2.62$, $SD = 1.46$), with moderately low scores within the groups across the time points.

Table 32.

Adjusted Means and Standard Errors for Scores on Moral Norm Averaged for Time 2 and 3

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Moral norm	4.08	2.88	2.79	3.25
	(0.32)	(0.33)	(0.32)	(0.32)

Note. Standard errors are in parentheses.

Self-Regulatory Processes

Data on action control and perceived self-regulatory success were analysed in a one-way, between-participants MANOVA (Wilk's Lambda), with the independent variable of self-affirmation (non-affirmed, standard self-affirmed, implementation intention self-affirmed). Action control and perceived self-regulatory success were significantly positively correlated at Time 2, $r(100) = 0.79$ $p < .001$, and Time 3, $r(65) = 0.76$, $p < .001$, indicating that it was appropriate to analyse these variables in a MANOVA.

At Time 2, there was no significant multivariate main effect of self-affirmation on self-regulatory processes, $F(4, 192) = 1.92$, $p = .109$, $\eta p^2 = .038$. Participants across the groups had similar moderately low to moderate scores on action control and perceived self-regulatory success. At Time 3, there was a significant multivariate main effect of self-affirmation on the self-regulatory processes, $F(4, 122) = 3.16$, $p = .017$, $\eta p^2 = .094$. Univariate analyses ($p = .025$) revealed that the main effect of self-affirmation was not significant on either Time 3 action control, $F(2, 62) = 2.68$, $p = .077$, $\eta p^2 = .079$, or Time 3 perceived self-regulatory success, $F(2, 62) < 1$, with participants across the groups having similar moderately low to moderate scores (Table 33).

Table 33.

Means and Standard Deviations for Scores on Action Control and Perceived Self-Regulatory Success at Time 2 and 3

Variable	Non-Affirmed	Standard Self-Affirmed	Implementation Intention Self-Affirmed	Full Sample
Action control				
	$n = 34$	$n = 32$	$n = 34$	$N = 100$
Time 2	4.65	3.60	3.81	4.03
	(1.61)	(2.01)	(1.73)	(1.82)
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Time 3	4.52	3.52	3.21	3.75
	(1.70)	(2.09)	(2.04)	(2.00)
Perceived self-regulatory success				
	$n = 34$	$n = 32$	$n = 34$	$N = 100$
Time 2	4.15	3.55	3.76	3.83
	(1.80)	(1.82)	(1.91)	(1.84)
	$n = 22$	$n = 21$	$n = 22$	$N = 65$
Time 3	3.98	4.10	3.86	3.98
	(1.84)	(1.972)	(2.14)	(1.96)

Note. Standard deviations are in parentheses.

Discussion

The study aimed, firstly, to investigate whether one of the reasons for the relative failure of self-affirmation to promote actual health behaviour lies in the motivational stage of health behaviour change (Schwarzer, 1992). This was achieved by assessing the quality of intentions formed following self-affirmation, which, according to Harris and Epton (2010), might not be genuine, thus, leading to their rapid dissolution outside experimental settings. The quality of intentions was investigated through the assessment of their established (operative stability) and novel (meta-stability and certainty) properties (Cooke & Sheeran, 2013). Secondly, the study aimed to further pursue the search for cognition-behaviour mechanisms behind the effects of self-affirmation, extending the range of mechanisms postulated in Study 1, such as expectancies and self-regulatory processes, by adding moral norm. Thirdly, the study probed a simpler method of self-affirmation, based on the standard format of

implementation intentions, alongside a more usual method and its control counterpart and assessed the effects of self-affirmation at two follow-ups, after 7 days and 1 month, to test for both short-term and longer-term effects of self-affirmation. Using the context of fruit and vegetable consumption, it was hypothesised that, compared to non-affirming, self-affirming with either of the self-affirmation manipulations would lead to stronger, operatively stable intentions (with no hypotheses being postulated about meta-stability or certainty of intentions) resulting in greater fruit and vegetable consumption at 7-day and 1-month follow-ups, more positive but realistic expectancies, and stronger feelings of moral norm and self-regulatory processes.

Given that the study extended the usual experimental framework for self-affirmation studies with a novel self-affirmation manipulation, it would be informative at the outset to discuss the success of the self-affirmation manipulations used for the purposes of interpreting their effects on the dependent variables. Specifically, on the only self-affirmation manipulation check applicable to all three groups (Napper et al., 2009) no significant differences were identified, with participants across the groups reporting that they gave a similar amount of thought to their positive aspects in the wake of their respective manipulations. Neither were there differences between the groups on the feelings of positive other-related or positive affect that were previously found to be affected by self-affirming (e.g., Crocker et al., 2008). While a lack of differences between the non-affirmed and implementation intention self-affirmed groups on these measures would be expected, as the former group was not asked to self-affirm and the latter group was only asked to set up an "if-then" plan for when they will self-affirm, a lack of differences between these groups and the standard self-affirmed group is unexpected. Indeed, on the other self-affirmation manipulation check applicable, due to its format, to only the standard self-affirmed and non-affirmed groups, the former group

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indicated that the value they wrote about was more important to them compared to the latter. Thus, there is some evidence that the standard self-affirmation manipulation worked as intended. As for the novel implementation intention self-affirmation manipulation, it appears to be reasonable to assume it was successful if it produces similar effects on the dependent variables to those produced by the more established standard self-affirmation manipulation.

It was found that participants in the two self-affirmation and the non-affirmation groups had similar moderately high to high intentions to consume fruit and vegetables after the self-affirmation manipulation at 7 days and 1 month. The intention scores collected immediately post manipulation were stronger than those collected after 7 days and 1 month, but the degree of their operative stability was similar across the groups. As regards certainty and meta-stability of intentions, the only significant difference identified was on the meta-stability of intentions item 2 ("How likely is it that your stated intention to eat at least 5 portions of fruit and vegetables every day in the next month will change?" [1, *very unlikely*, 7, *very likely*; scores recoded]) at the 7-day follow-up, with the implementation intention self-affirmed group having greater subjective perception of the stability of their intentions than the non-affirmed group. While the above findings did not show that the standard self-affirmation manipulation produces additional beneficial effects on intentions and their properties to those produced by a persuasive health message alone, they did not show either that the standard self-affirmation manipulation leads to the formation of intentions that are not genuine, as scores on the intention properties remained moderately high to high over a 1-month period. The increased feelings of meta-stability of intentions in the implementation intention self-affirmed group coupled with the absence of such increases in the standard self-affirmed group serves as an initial indication that the novel

self-affirmation manipulation might be qualitatively different from the more established one.

Once again in this thesis no evidence was found that self-affirmation significantly promoted intentions in the presence of a message; however, unlike in the previous study, fruit and vegetable consumption was promoted. Specifically, the standard self-affirmed group consumed more fruit and vegetables than the implementation intention self-affirmed group on the longitudinal measure of consumption, with the effect being driven by the differences in consumption at the 1-month follow-up. The different behavioural effects of the standard self-affirmation and the implementation intention self-affirmation manipulations give more weight to the suggestion that the novel manipulation does not share the self-affirming qualities of the standard one. The finding of increased fruit and vegetable consumption in the standard self-affirmed group in the face of the lack of effects on intentions, taken together with the conceptually similar findings of Epton and Harris (2008), provide evidence that intentions might not necessarily be a mechanism underlying the behavioural effects of self-affirmation. Having said that, among the alternative mechanisms probed, such as expectancies, moral norm and self-regulatory processes, none was affected exactly as hypothesised. Specifically, self-affirmation did not have a beneficial effect on expectancies over and above that produced by the health message, with participants across the groups and time points expecting to eat in the region of 5 portions of fruit and vegetables every day. In addition, all groups had realistically positive expectancies about their future fruit and vegetable consumption, with the implementation intention self-affirmed group being the only one that underestimated the amount of fruit and vegetables they actually consumed at the 7-day follow-up. Neither were there any beneficial effects of self-affirmation on moral norm. On the contrary, compared to the

non-affirmed group, both self-affirmed groups had lower scores on the longitudinal measure of moral norm, with the effect being driven by the differences at both 7-day and 1-month follow-ups. Despite the significant multivariate main effect of self-affirmation on self-regulatory success at the 1-month follow-up, no differences between the groups were found on action control and perceived self-regulatory success when considered separately. The inspection of means, however, suggested that only the means for perceived self-regulatory success but not action control were in the predicted direction (i.e., were enhanced) for the standard self-affirmed group.

When interpreting the differences between the groups in the current study, on the one hand, it is important to remember that differences were found only on a small number of statistical tests in the whole family of tests. Thus, there is some likelihood that these differences arose from an inflated familywise error rate that leads to the Type I error, in which the null hypothesis (i.e., no difference between the groups exists) is rejected in error. On the other hand, the study was underpowered meaning that, even if differences between the groups existed, the small participant numbers might have prevented these differences from being observed. Specifically, the maximum number of participants whose responses were analysed on the dependent variables were 43 for the non-affirmed, 41 for standard self-affirmed and 44 for implementation intention self-affirmed groups, but Cohen (1992) states that 52 participants are necessary per group to observe a medium-sized effect at power = .80 for α = .05 in an ANOVA with 3 levels of the independent variable. Further, while the current study aimed to address some of the general limitations of Study 1 and other health-related self-affirmation research, its generalisability remained limited. Specifically, participants in the study were once again predominantly young women in their late teens or early twenties reading for a university degree. The demographic differences found between eligible and ineligible

participants (those ineligible were more likely to be a female 2 years older than those eligible) and between eligible participants who did or did not carry on participating in the study after completing the baseline measures (those who carried on were more likely to be female) appear to be less problematic. This is because they are consistent with the trend of lower fruit and vegetable consumption of men and younger adults (Health & Social Care Information Centre, 2011) and of more frequent participation of women in health-related self-affirmation research (Harris & Epton, 2009). In addition, in common with the majority of health-related self-affirmation studies, the current study used self-reported measures of behaviour, but in an attempt to diminish drawbacks associated with self-report (e.g., limited validity stemming from a tendency of participants to estimate, rather than recall, the frequency of common behaviours, Schwarz, 1999), three measures of fruit and vegetable consumption were employed, which represents an even greater degree of built-in redundancy compared to Study 1. Another improvement on the limitations of Study 1 was the use of an additional, longer follow-up period, which proved to be fruitful in helping to identify the longer-term behavioural effects of self-affirmation.

To conclude, Study 2 did not find beneficial effects of self-affirmation on either intentions to consume fruit and vegetables and their properties (operative stability, meta-stability and certainty), or on the alternative mechanisms of self-affirmation (expectancies, moral norm and self-regulatory processes). Despite this, it showed the ability of self-affirmation to produce health-behaviour change enduring over a period of 1 month. This finding extended the previous success of Epton and Harris (2008) in promoting a short-term increase in fruit and vegetable consumption to a longer-term increase, which was at the time the longest behavioural effect of self-affirmation demonstrated. The venture into using simpler means of self-affirmation did not prove to

be successful, but was, notwithstanding, one of the first moves towards a tangible simplification of the usual format of self-affirmation manipulations (e.g., positive traits affirmation in Jessop et al., 2009).

Study 2 completed the examination of the research avenues into the motivational reasons for the relative failure of self-affirmation to produce health behaviour change investigated in the current thesis. It did not find motivational benefits associated with self-affirmation on the process of health-behaviour change, but neither did it find drawbacks. This, taken together with the demonstration of the increased fruit and vegetable consumption in the current study, suggested that a move towards investigating volitional reasons for the relative failure of self-affirmation to promote health behaviour change is warranted. In recognition that, at the time, behavioural effects of self-affirmation were more of an exception than a rule, supplementing a self-affirmation manipulation with a volitional intervention appeared to allow for the investigation of both the individual behavioural effects of self-affirmation, as well as its synergistic behavioural effects in combination with a volitional intervention. In view of the fact that long-term health gains normally depend on long-term performance of health behaviours, a longer follow-up period for investigating the effects of self-affirmation was also deemed appropriate.

CHAPTER FOUR

Study 3

Exploring the Effects of a Combination of Self-Affirmation and Implementation Intentions on Fruit and Vegetable Consumption[13]

As even people with strong intentions may not translate them into actual behaviour (Orbell & Sheeran, 1998), an investigation of one of the potential volitional explanations for the relative failure of self-affirmation to produce health behaviour change, namely the intention-behaviour gap (Sheeran et al., 2005) and one of the methods to reduce it, namely implementation intentions (Gollwitzer, 1993), forms the focus of the current study. In particular, Study 3 aims to investigate the effects of supplementing a self-affirmation manipulation with an implementation intention manipulation to test the separate effects of self-affirmation, as well as the interactive effects of self-affirmation and implementation intentions on health-related behaviour. In addition, in view of the need to demonstrate that the improved health-related behaviour can endure for longer time periods, a 3-month follow-up is built into the study.

The Intention-Behaviour Gap

According to the meta-analysis of meta-analyses of the intention-behaviour relationship by Sheeran (2002), intentions explain a "good" amount of variance in behaviour (28%, p. 5). Having said that, a 72% discrepancy in the intention-behaviour relationship represents a sizable percentage of unexplained variance and the reasons for the so-called "intention-behaviour gap" have been researched and identified. It was found that the main contributors to the intention-behaviour inconsistency are people

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[13] A paper based on the current study and entitled "Combining self-affirmation with implementation intentions to promote fruit and vegetable consumption" was accepted for publication in *Health Psychology* on the 4th December 2013.

who do not perform behaviour despite being motivated to do so, known as "inclined abstainers" (Orbell & Sheeran, 1998). They represent almost half (47%) of those with positive intentions (Sheeran, 2002) and their failure to translate intentions into actions has been linked to the deficiencies in intentions they form.

Sheeran et al. (2005) identified three characteristics of intentions that might be wanting in inclined abstainers: intention viability (i.e., whether a person has "particular abilities, resources or opportunities" to fulfil it, p. 277), intention activation (i.e., the level of its "salience, direction or intensity" compared to competing intentions, p. 278) and intention elaboration (i.e., whether a person carries out "an analysis of the particular actions and contextual opportunities" necessary to realise it, p. 279). It follows that a relative failure of self-affirmation to promote health-related behaviour despite raised intentions to do so might be due to deficiencies in the above characteristics of the intentions. With regard to insufficient intention viability, Sheeran et al. (2005) stated that this deficiency of intentions lies outside the realm of psychological science, since it cannot be changed by psychological means, but rather by economic and political ones. The other two characteristics of intentions could potentially be manipulated using psychological techniques. Specifically, insufficient intention activation, which is linked to situations in which contextual cues render pleasurable goal pursuits more important than the realisation of health-related intentions, might be manipulated with reminders about the necessity to perform particular actions and their importance. Insufficient intention elaboration that occurs when people fail to think through the situations in which to strive for and actions needed to achieve their goal might be addressed with the formation of implementation intentions, which in conjunction with self-affirmation are investigated in the current study.

Implementation Intentions

Implementation intentions are plans in the "if-then" format in which the "if" part specifies the situation (i.e., cue: "when?" and "where?") and the "then" part specifies the actions (i.e., response: "how?") for goal striving (Gollwitzer, 1993). Rather than combating a person's regular routine, implementation intentions build on it by extending it with actions needed to be performed to achieve a desired goal when specific situational cues are encountered. To illustrate, if a person would like to incorporate more vegetables into his or her diet, the following implementation intention plan could be formed: "If I am eating out in the evening, then I will order a side salad with my meal!" The specificity of the context and response evident in the above example constitutes the main difference between implementation intentions and intentions and is the means of creating a link between the environmental cue and the response to it (Gollwitzer, 1999). By creating such links, the mental representation of the critical situation becomes more accessible to a person (Webb & Sheeran, 2007), leading to its rapid recognition when it presents itself (Parks-Stamm, Gollwitzer, & Oettingen, 2007) and an automatic elicitation of the response to it (Gollwitzer & Sheeran, 2006). Importantly, despite the fact that the formation of implementation intentions is a conscious process carried out reflectively, the response to the cue is a nonconscious process elicited automatically, which allows for goal striving with less effort (Gilbert, Gollwitzer, Cohen, Oettingen, & Burgess, 2009; Sheeran et al., 2013).

Substantial evidence has accumulated that people who form implementation intentions are more likely to translate their motivation to improve health-related behaviour into actual behaviour. In meta-analytical research, Gollwitzer and Sheeran (2006) found a medium effect (Cohen's $d = .59$) of implementation intentions on the uptake and the reduction of a variety of health-related behaviours and Adriaanse,

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Vinkers, de Ridder, Hox and de Wit (2011) found a small effect (Cohen's $d = .29$) on the reduction and a medium effect (Cohen's $d = .51$) on the uptake of behaviours related to healthy eating. An example of the beneficial effect of implementation intentions on the reduction of unhealthy eating behaviours is the findings by Luszczynska, Scholz and Sutton (2007) of lesser fat consumption at a 6-month follow-up among cardiac patients who formed implementation intentions on top of the rehabilitative information about healthy eating compared to patients who received the information only. An example of the beneficial effect of implementation intentions on the uptake of healthy eating behaviours is the findings by Chapman et al. (2009) which demonstrated that, compared to control participants, participants who formed implementation intentions consumed more fruit and vegetables after 7 days, with participants who formed them in the "if-then" format consuming more than participants who formed them in the global format (i.e., devised without the constraint of a particular structure).

Combining Self-Affirmation and Implementation Intention Manipulations

The successful application of self-affirmation in conjunction with a health message to the promotion of motivation to change health behaviour in the majority of self-affirmation research, coupled with the ability of implementation intentions to promote such behaviour, suggests the possibility of synergistic beneficial effects between these manipulations. In published self-affirmation literature, the effect of a combination of self-affirmation and implementation intentions is yet to be investigated, but the success of studies combining either self-affirmation or implementation intentions with other interventions is an indication that it is a promising research avenue. For example, a combination of self-affirmation and positive affect interventions in addition to patient education was found to increase physical exercise in patients who underwent percutaneous coronary procedures (Peterson et al., 2012) and

medication adherence in African Americans suffering from high blood pressure (Ogedegbe et al., 2012). Similarly, a combination of a health message based on the PMT theory and implementation intentions was found to increase physical activity (Milne, Orbell, & Sheeran, 2002) and a combination of a health message promoting self-efficacy and intentions and implementation intentions was found to increase fruit and vegetable consumption (Kellar & Abraham, 2005).

The promising results of studies combining motivational and volitional interventions led Milne et al. (2002) to call for more investigations building on the combined strength of the two types of interventions. As regards the application of this paradigm to self-affirmation research, Harris and Epton (2010) suggested that a combination of self-affirmation with implementation intentions might lead to a reduction in the intention-behaviour gap found in the majority of self-affirmation studies available at the time. Self-affirming before the formation of implementation intentions might result not only in greater motivation to change behaviour, but also in greater motivation to exploit opportunities conducive to behaviour change, such as those offered by implementation intentions. The rationale behind this theorising is based on the findings by Ferrer, Shmueli, Bergman, Harris and Klein (2012) that self-affirmed female participants experiencing positive affect after reading a threatening health message about a link between excessive alcohol consumption and breast cancer were readier to come up with specific steps needed to reduce their intake of alcohol, which is akin to forming implementation intentions. Further, a high-level construal orientation, that is, the identification of actions in terms of end states rather than the means of achieving these ends, found in self-affirmed participants might help them better distinguish impulsive gratifications from important long-term goals (Wakslak & Trope, 2009), which should increase the likelihood of if-then planning being acted upon. In a

nutshell, self-affirming before the formation of implementation intentions could result in greater readiness to both form and act on implementation intentions.

The Current Study

To address the research avenues outlined above, Study 3 aimed to examine the effects of self-affirmation and its combination with implementation intentions on measures of (a) behaviour, (b) intentions and (c) potential mechanisms underlying these effects, such as expectancies and self-regulatory processes (discussed in Study 1). The context for carrying out the investigation was fruit and vegetable consumption, which was extended from Study 1 and 2. Two follow-ups were incorporated into the study, with the length of one of them, 7 days, matching the length of the follow-ups in Epton and Harris's (2008) study, in Study 1, and the first follow-up in Study 2 and the length of the other, 3 months, building on the success of Study 2 in promoting behaviour over a period of 1 month.

In the current study, participants reported their baseline fruit and vegetable consumption, completed either a self-affirming or non-affirming task, read a health message about fruit and vegetable consumption, completed measures of intentions and the potential mechanisms of the effects of self-affirmation, either formed or did not form implementation intentions, and after 7 days and 3 months reported their actual fruit and vegetable consumption. It was hypothesised that, compared to non-affirmed participants, self-affirmed participants would show (a) greater fruit and vegetable consumption after 7 days and 3 months, (b) stronger intentions, (c) more positive but realistic expectancies, and (d) stronger feelings of action control and perceived self-regulatory success, (e) with a combination of self-affirmation and implementation intentions leading to enhanced effects relative to those produced by self-affirmation alone.

Method

Design

The study had a two-way, between-participants experimental design, with the manipulated independent variables of self-affirmation (non-affirmed, self-affirmed) and implementation intentions (no implementation intentions, implementation intentions). Among the principal dependent variables were measures of intentions and expectancies related to fruit and vegetable consumption, measures of action control and perceived self-regulatory success, and self-reported fruit and vegetable consumption taken after 7 days and 3 months.

Participants

Participants were recruited by email from a pool of research staff and graduate and undergraduate students to take part in a study of diet and health beliefs in exchange for being entered into a prize draw for £450 (2 awards of £100, 3 awards of £50, and 4 awards of £25). Interested participants ($N = 1,271$) were assessed for eligibility, of whom 973 were found to be eligible. Among those eligible, 447 (45.9%) followed a link to the main study pages, of these 339 (75.8%) completed the measures at Time 1 and, therefore, comprised the Time 1 sample. This sample had a mean age of 22.30 years ($SD = 5.87$, range 18-54 years) and consisted predominantly of students (94.1%, $n = 319$), females (71.1%, $N = 241$), and people who described themselves as of white Caucasian origin (79.1%, $n = 268$)[14]. Of the Time 1 sample, $n = 251$ (74.0%) were retained at Time 2, the 7-day follow-up, and $n = 163$ (48.1%) at Time 3, the 3-month follow-up, (Figure 6).

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[14] The remaining participants described themselves as of Asian (12.1%, $n = 41$), mixed (3.2%, $n = 11$), black (0.9%, $n = 3$), other (1.2%, $n = 4$) ethnic origin, or withheld information (3.6%, $n = 12$).

Assessed for
Eligibility
$N = 1,271$
Ineligible
$n = 298$

Lost to
Randomisation
$n = 526$

Randomised to
Condition
$n = 447$

Non-Affirmed No Implementation Intentions	Non-Affirmed Implementation Intentions	Self-Affirmed No Implementation Intentions	Self-Affirmed Implementation Intentions
Time 1 Analysed $n = 84$ Did not Complete $n = 18$	Analysed $n = 87$ Did not Complete $n = 26$	Analysed $n = 79$ Did not Complete $n = 39$	Analysed $n = 89$ Did not Complete $n = 25$
7 Days Analysed $n = 70$ Lost to Follow-up $n = 14$	Analysed $n = 63$ Lost to Follow-up $n = 24$	Analysed $n = 56$ Lost to Follow-up $n = 23$	Analysed $n = 62$ Lost to Follow-up $n = 27$
3 Months Analysed $n = 48$ Lost to Follow-up $n = 22$	Analysed $n = 43$ Lost to Follow-up $n = 20$	Analysed $n = 36$ Lost to Follow-up $n = 20$	Analysed $n = 36$ Lost to Follow-up $n = 26$

Figure 6. Participant flow through Study 3.

Materials

Pre-test measures. Pre-test measures were the same as those used in Study 2. After standardisation, the three measures of fruit and vegetable consumption had between them reasonably high internal reliability ($\alpha = .67$) and were combined into a single measure of baseline consumption before being log-transformed.

Self-affirmation manipulation. The self-affirmation manipulation was the same as that used in Study 1.

Self-affirmation manipulation check and potential mediators. To provide a manipulation check, three thought-centred items developed by Napper et al. (2009; $\alpha = .85$) and detailed in Study 2 were placed after the Time 1 dependent measures.

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Measures of potential mediators, such as positive other-related affect (Crocker et al., 2008; α = .80) and positive affect (Aarts & Dijksterhuis, 2003, α = .57 improved to α = .69 after the exclusion of one item) were the same as those used in Study 1.

Health message. The health message was the same as that used in Study 1.

Principal dependent variables. *Intentions* were measured by two items ($\alpha \geq$ .85), "In the next 3 months, I am definitely going to eat at least 5 portions of fruit and vegetables every day" (1, *strongly disagree*, 7, *strongly agree*) and "In the next 3 months, I intend eating at least 5 portions of fruit and vegetables every day" (1, *strongly disagree*, 7, *strongly agree*). *Expectancies* were measured by the two items (adapted from Steptoe et al., 2003; αs $\geq$ .27) detailed in Study 1 that focused on the next 3 months instead of 7 days.

Implementation intention manipulation. Participants randomised to form implementation intentions were asked to make plans about how to eat more fruit and vegetables using a format from Brown et al.'s (2009) study. Each plan had an "If … then …" structure, with the "if" part completed (e.g., "If I eat out during the day,") and the "then" part requiring completion (e.g., "then [write in what fruit you will have]!"). Each was preceded by an example (e.g., "**If** I eat out during the day, **then** I will have a banana after my food!") presented in a thought bubble (Figure 7). Participants formed five action plans targeting buying, eating and cooking and two coping plans targeting excuses to avoid change (e.g., "If I start to talk myself out of eating fruit and vegetables [write in your excuses]", "then [write in what you will say to yourself to prevent excuses from working]!").

If I eat out during the day,

then I will have a banana after my food!
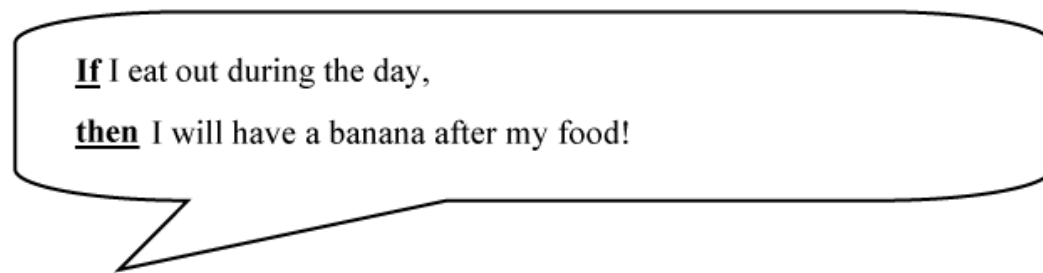
MY PLAN

If I eat out during the day,

then (*write in what fruit you will have*)!

Figure 7. Example of implementation intentions.

Follow-up measures. The measures of fruit and vegetable consumption (αs $\geq$ .51), intentions and expectancies were taken again after 7 days and 3 months. Additionally, the follow-up measures included measures of retrospective action control and perceived self-regulatory success. Six *action control* items (adapted from Sniehotta et al.'s, 2006, study; αs $\geq$ .92) were those used in Study 2. Three *perceived self-regulatory success* items (adapted from Fishbach et al.'s, 2003, Study 4; αs $\geq$ .60 improved to αs $\geq$ .70 after the exclusion of one item) were those used in Study 1.

Procedure

The procedure was similar to that detailed in Study 2, except that participants were randomised to work on only the self-affirming or non-affirming task before reading the health message and completing measures of the dependent variables and to either form or not form implementation intentions after completing measures of the dependent variables, with the 3-month follow-up replacing that of 1-month.

<div align="center">**Results**</div>

Preliminary Checks

Ineligible participants ($n = 298$) were on average 2.34 years older than eligible

participants ($n = 973$), $F(1, 1269) = 33.92$, $p < .001$, $\eta p^2 = .026$, and were more likely to

be female, $\chi^2(1, N = 1271) = 5.95$, $p = .015$, and not a student (occupation was collapsed

into categories of "not student" and "student" to meet the requirement for the expected

cell count), $\chi^2(1, N = 1271) = 7.29$, $p = .007$, (Table 34).

Table 34.
Characteristics of Ineligible and Eligible Participants

Variable		Ineligible	Eligible	Full Sample
		$n = 298$	$n = 973$	$N = 1,271$
Age				
	M	24.36	22.02	22.57
	SD	(7.77)	(5.44)	(6.14)
Sex				
	Male	74	314	388
	Female	224	659	883
Occupation				
	Not student	33	62	95
	Student	265	911	1,176

Eligible participants who followed the link to Time 1 measures ($n = 447$) did not

differ from those who did not ($n = 526$) in age, $F(1, 971) < 1$, sex, $\chi^2(1, N = 973) =$

2.40, $p = .122$, occupation (collapsed as above), $\chi^2(1, N = 973) = 2.09$, $p = .149$, or on

the baseline measure of fruit and vegetable consumption, $F(1, 849) < 1$, (Table 35).

Table 35.

Characteristics of Participants Who Did Not Follow and Followed a Link to Time 1 Measures

Variable	Did not Follow Link	Followed Link	Full Sample
	$n = 526$	$n = 447$	$N = 973$
Age			
M	22.05	21.98	22.02
SD	(5.49)	(5.38)	(5.44)
Sex			
Male	181	133	314
Female	345	314	659
Occupation			
Not student	39	23	62
Student	487	424	911
	$n = 404^{b}$	$n = 447$	$N = 851$
Baseline consumption (z scores)[a]	0.59	0.60	0.59
	(0.08)	(0.08)	(0.08)

Note. Unless specified, means with standard deviations in parentheses. [a]Scores were log-transformed to reduce the impact of outliers. [b]The drop in *n* is due to missing data.

Participants who completed Time 1 measures ($n = 339$) did not differ from participants who started but did not complete Time 1 measures ($n = 108$) in sex, $\chi^2(1, N = 447) = 0.48$, $p = .489$, occupation (collapsed as above), $\chi^2(1, N = 447) = 1.64$, $p = .201$, or the baseline measure of fruit and vegetable consumption, $F(1, 445) = 2.51$, $p = .114$, $\eta p^2 = .006$. However, those completing the Time 1 measures were on average 1.30 years older than those not completing them, $F(1, 445) = 4.81$, $p = .029$, $\eta p^2 = .011$, (Table 36).

Table 36.

Characteristics of Eligible Participants Who Did Not Complete and Completed Time 1 Measures

Variable	Did Not Complete Time 1	Completed Time 1	Full Sample
	$n = 108$	$n = 339$	$N = 447$
Age	22.30	21.00	21.98
	(5.87)	(3.21)	(5.38)
Sex			
Male	98	35	133
Female	241	73	314
Occupation			
Not student	20	3	23
Student	319	105	424
Baseline consumption (z scores)[a]	0.59	0.61	0.60
	(0.08)	(0.07)	(0.08)

Note. Unless specified, means with standard deviations in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

There were no differences between participants who completed Time 1 measures ($n = 176$) and those who completed measures at all three time points ($n = 163$) in age, $F(1, 337) < 1$, or occupation (collapsed as above), $\chi^2(1, N = 339) = 0.08$, $p = .776$. However, those completing measures at all three time points were more likely to be female, $\chi^2(1, N = 339) = 5.89$, $p = .015$, and had greater scores on the baseline measure of fruit and vegetable consumption, $F(1, 337) = 4.81$, $p = .029$, $\eta p^2 = .014$, (Table 37).

Table 37.

Characteristics of Eligible Participants Who Completed Time 1 and Time 1, 2 and 3 Measures

Variable	Completed Time1	Completed Time 1, 2, 3	Full Sample
	$n = 176$	$n = 163$	$N = 339$
Age	22.27	22.33	22.30
	(6.14)	(5.59)	(5.87)
Sex			
Male	61	37	98
Female	115	126	241
Occupation			
Not student	11	9	20
Student	165	154	319
Baseline consumption (z scores)[a]	0.58	0.60	0.59
	(0.08)	(0.07)	(0.08)

Note. Unless specified, means with standard deviations in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

Randomisation Check

To determine the success of the randomisation procedure, a Pearson Chi-square analysis was run on sex and two-way, between-participants ANOVAs with the independent variable of self-affirmation (non-affirmed, self-affirmed) and implementation intentions (no implementation intentions, implementation intentions) were run on age and the baseline measure of fruit and vegetable consumption for the Time 1 sample. No differences were found between any of the conditions in sex, $\chi^2(3, N = 339) = 1.21$, $p = .751$, age, largest $F(1, 335) = 1.91$, $p = .168$, $\eta p^2 = .006$ (for self-affirmation), or the baseline measure of fruit and vegetable consumption, largest $F(1, 335) = 1.36$, $p = .224$, $\eta p^2 = .004$ (for self-affirmation), suggesting that randomisation to conditions was successful (Table 38).

Table 38.
Baseline Sample Characteristics

Variable	Non-Affirmed		Self-Affirmed		Full Sample
	No Implementation Intentions	Implementation Intentions	No Implementation Intentions	Implementation Intentions	
	$n = 84$	$n = 87$	$n = 79$	$n = 89$	$N=339$
Age	21.98	21.71	22.13	23.33	22.30
	(5.56)	(6.75)	(4.19)	(6.45)	(5.87)
Sex					
Male	26	26	19	27	98
Female	58	61	60	62	241
Baseline consumption (z scores)[a]	0.59	0.59	0.60	0.60	0.60
	(0.08)	(0.07)	(0.07)	(0.09)	(0.08)

Note. Unless specified, means with standard deviations in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

Self-Affirmation Manipulation Check and Potential Mediators

Using a one-way ANOVA, with the independent variable of self-affirmation (non-affirmed, self-affirmed), there was a significant main effect of self-affirmation on the thought-centred manipulation check, $F(1, 334) = 9.45$, $p = .002$, $\eta p^2 = .028$, suggesting that participants were more self-affirmed in the experimental than the control group (Table 39). In the funnel debriefing procedure no participants showed awareness of a link between self-affirmation manipulation and their responses to the dependent measures.

Table 39.
Means and Standard Deviations for Scores on the Measure of Self-Affirmation Manipulation Check

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Self-affirmation manipulation check			
	$n = 171$[a]	$n = 165$	$N = 336$
Though-centred	4.13	4.59	4.36
	(1.34)	(1.40)	(1.39)

Note. Standard deviations are in parentheses. [a]The drop in *n* is due to missing data.

The two potential mediators, positive other-related and positive affect, were significantly positively correlated, $r(339) = 0.66$, $p < .001$, indicating that it was

appropriate to analyse these variables in a MANOVA. Using a one-way MANOVA (Wilk's Lambda), with the independent variable of self-affirmation (non-affirmed, self-affirmed) and two continuous dependent variables of positive other-related and positive affect, there was a significant multivariate main effect of self-affirmation on the potential mediators, $F(2, 336) = 4.51$, $p = .012$, $\eta p^2 = .026$. Univariate analyses ($p =.025$) revealed a significant effect of self-affirmation on positive affect, $F(1, 337) = 9.01$, $p = .003$, $\eta p^2 = .026$, with self-affirmed participants reporting more positive affect than non-affirmed participants. The effect of self-affirmation on positive-other related affect was not significant, $F(1, 337) = 3.42$, $p = .065$, $\eta p^2 = .010$, (Table 40).

Table 40.
Means and Standard Deviations for Scores on the Measures of Potential Mediators

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Potential mediators			
	$n = 171$	$n = 168$	$N = 339$
Positive other-related affect	3.22	3.37	3.29
	(0.77)	(0.75)	(0.76)
Positive affect	4.04	4.40	4.22
	(1.07)	(1.13)	(1.11)

Note. Standard deviations are in parentheses.

Behaviour

Differences on the combined measure of fruit and vegetable consumption at Time 2 and 3 were, first, analysed separately in exploratory analyses using a two-way, between-participants ANCOVA with the between-participants independent variables of self-affirmation condition (non-affirmed, self-affirmed) and implementation intention condition (no implementation intentions, implementation intentions) and the baseline measure of fruit and vegetable consumption entered as a covariate. Next, a longitudinal analysis was run on data for participants who completed measures at the three time points. These data were analysed in a three-way ANCOVA for mixed designs, with the between-participants independent variables of self-affirmation (non-affirmed, self-

affirmed) and implementation intentions (no implementation intentions, implementation intentions), the within-participants independent variable of time (time 2, time 3), and the baseline measure of fruit and vegetable consumption entered as a covariate. Finally, an intention-to-treat analysis was run, in which missing Time 2 and 3 data for participants who were randomised to the conditions but dropped out from the study was imputed and amounted to the mean baseline fruit and vegetable consumption ($M = -0.0004$) that was log-transformed in line with the other analyses of behaviour.

In the exploratory analyses, the regression of the baseline measure of fruit and vegetable consumption on its Time 2 and Time 3 counterparts was statistically significant ($p < .001$). There was a significant main effect of self-affirmation on the measure of fruit and vegetable consumption at Time 2, $F(1, 246) = 9.28$, $p = .003$, $\eta p^2 = .036$, with self-affirmed participants reporting eating significantly more portions of fruit and vegetables than non-affirmed participants. The main effect of implementation intentions was not significant, $F(1, 246) = 3.57$, $p = .060$, $\eta p^2 = .014$. These effects were qualified by a significant self-affirmation x implementation intention interaction, $F(1, 246) = 4.12$, $p = .044$, $\eta p^2 = .016$, (Figure 8). Simple effects analyses indicated that self-affirmation significantly increased consumption in the implementation intention condition ($M_{NA} = 0.59$, $SE = 0.01$; $M_{SA} = 0.62$, $SE = 0.01$), $F(1, 248) = 9.50$, $p = .002$, but not in the no implementation intention condition ($M_{NA} = 0.59$, $SE = 0.01$; $M_{SA} = 0.59$, $SE = 0.01$), $F(1, 248) = 2.22$, $p = .138$. At Time 3, there was again a significant main effect of self-affirmation, $F(1, 158) = 7.82$, $p = .006$, $\eta p^2 = .047$, with self-affirmed participants reporting eating significantly more portions of fruit and vegetables than non-affirmed participants. The main effect of implementation intentions was not significant, $F(1, 158) = 2.64$, $p = .106$, $\eta p^2 = .016$, and neither was the interaction, $F(1,158) < 1$, (Table 41).

Table 41.

Means and Standard Deviations for Scores on Fruit and Vegetable Consumption at Time 2 and 3

Variable	Non-Affirmed		Self-Affirmed		Full Sample
	No Implementation Intentions	Implementation Intentions	No Implementation Intentions	Implementation Intentions	
Consumption (z scores)[a]					
	$n = 70$	$n = 63$	$n = 56$	$n = 62$	$N = 251$
Time 2	0.58	0.58	0.60	0.62	0.60
	(0.07)	(0.06)	(0.06)	(0.08)	(0.07)
	$n = 48$	$n = 43$	$n = 36$	$n = 36$	$N = 163$
Time 3	0.57	0.59	0.61	0.62	0.60
	(0.07)	(0.08)	(0.08)	(0.08)	(0.08)

Note. Standard deviations are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

Figure 8. The interaction between self-affirmation and implementation intention conditions on fruit and vegetable consumption at the 7-day follow-up. Vertical lines represent one standard error of the means.

In the longitudinal analysis, the regression of the baseline fruit and vegetable consumption measure on its longitudinal counterpart was statistically significant ($p < .001$). There was a significant main effect of self-affirmation on fruit and vegetable consumption, $F(1, 158) = 13.01$, $p < .001$, $\eta p^2 = .076$, with the self-affirmed participants consuming more fruit and vegetables than non-affirmed participants. There was no significant main effect of implementation intentions, $F(1, 158) = 2.54$, $p = .113$, $\eta p^2 = .016$, or time, $F(1, 158) < 1$ ($M_{TIME2} = 0.60$, $SD = 0.00$; $M_{TIME3} = 0.60$, $SD = 0.01$), nor significant interaction effects involving self-affirmation, implementation intentions and time, largest $F(1, 158) = 1.39$, $p < .241$, $\eta p^2 = .009$ (for the time x self-affirmation x implementation intention interaction), (Table 42).

Table 42.
Adjusted Means and Standard Errors for Scores on Fruit and Vegetable Consumption Averaged for Time 2 and 3

Variable	Non-Affirmed		Self-Affirmed		Full Sample
	No Implementation Intentions	Implementation Intentions	No Implementation Intentions	Implementation Intentions	
	$n = 48$	$n = 43$	$n = 36$	$n = 36$	$N = 163$
Consump-tion (z scores)[a]	0.58 (0.01)	0.59 (0.01)	0.60 (0.01)	0.62 (0.01)	0.60 (0.01)

Note. Standard errors are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

In the intention-to-treat analysis, the regression of the baseline fruit and vegetable consumption measure on its intention-to-treat counterpart was statistically significant ($p < .001$). The main effect of self-affirmation on fruit and vegetable consumption remained statistically significant, $F(1, 442) = 12.72$, $p < .001$, $\eta p^2 = .028$, (Table 43).

Table 43.

Adjusted Means and Standard Errors for Intention-to-Treat Scores on Fruit and Vegetable Consumption Averaged for Time 2 and 3

Variable	Non-Affirmed		Self-Affirmed		Full Sample
	No Implementation Intentions	Implementation Intentions	No Implementation Intentions	Implementation Intentions	
	$n = 102$	$n = 113$	$n = 118$	$n = 114$	$N = 447$
Consumption (z scores)[a]	0.59	0.60	0.60	0.61	0.60
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Note. Standard errors are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

Predictors of Behaviour

Data on intentions and expectancies were analysed separately in exploratory analyses using a two-way, between-participants ANOVA, with the between-participants independent variable of self-affirmation (non-affirmed, self-affirmed) and implementation intentions (no implementation intentions, implementation intentions). Additionally, longitudinal analyses were run on data from participants who completed measures at all three time points. These were analysed in a three-way, between-participants ANOVA for mixed designs, with the between-participants independent variables of self-affirmation (non-affirmed, self-affirmed) and implementation intentions (no implementation intentions, implementation intentions), and the within-participants independent variable of time (time 1, time 2, time 3). Given that in the current study a drop in participant numbers at Time 2 and 3 rendered the longitudinal analyses less powerful than the exploratory analyses, the outcomes of the former on the between-participants independent variables (self-affirmation and implementation intentions) are reported only for dependent variables with significant effects in the exploratory analyses, with outcomes on the within-participant variable (time) reported throughout.

Intentions and expectancies. In the exploratory analyses, there were no main effects of self-affirmation on either intentions at Time 1, $F(1, 335) = 2.03$, $p = .156$, $\eta p^2 = .006$, Time 2, $F(1, 244) = 1.66$, $p = .199$, $\eta p^2 = .007$, or Time 3, $F(1, 157) < 1$. Similarly, there were no main effects of implementation intentions on either intentions at Time 1, $F(1, 335) = 1.12$, $p = .290$, $\eta p^2 = .003$, Time 2, $F(1, 244) = 2.96$, $p = .087$, $\eta p^2 = .012$, or Time 3, $F(1, 157) = 1.22$, $p = .272$, $\eta p^2 = .008$. Nor were there interaction effects involving self-affirmation and implementation intentions at any time point, largest $F(1, 244) = 1.70$, $p = .194$, $\eta p^2 = .007$ (at Time 2). At all three time points, participants across the groups had moderately high scores on intentions. There was a significant main effect of self-affirmation on expectancies at Time 2, $F(1, 244) = 10.77$, $p = .001$, $\eta p^2 = .042$, but not at Time 1, $F(1, 335) = 1.96$, $p = .163$, $\eta p^2 = .006$, or Time 3, $F(1, 157) = 1.20$, $p = .274$, $\eta p^2 = .008$. There were no main effects of implementation intentions on expectancies at either Time 1, $F(1, 335) < 1$, Time 2, $F(1, 244) = 1.00$, $p = .318$, $\eta p^2 = .004$, or Time 3, $F(1, 157) < 1$. Nor were there interaction effects involving self-affirmation and implementation intentions on expectancies at any time point, all F's < 1, (Table 44).[15]

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[15] The log-transformation of scores on expectancies prevented commenting on their magnitude. However, raw scores on expectancies suggested that both non-affirmed (Time 1: $M = 4.86$, $SD = 1.60$; Time 2: $M = 4.81$, $SD = 0.92$) and self-affirmed (Time 1: $M = 5.16$, $SD = 1.99$; Time 2: $M = 5.06$, $SD = 1.13$) participants expected to eat either around or more than 5 portions of fruit and vegetables every day in the next 3 months at Time 1 and 2.

Table 44.

Means and Standard Deviations for Scores on Intentions and Expectancies at Time 1, 2 and 3

| Variable | Non-Affirmed | | Self-Affirmed | | Full Sample |
	No Implementation Intentions	Implementation Intentions	No Implementation Intentions	Implementation Intentions	
Intentions					
	$n = 84$	$n = 87$	$n = 79$	$n = 89$	$N = 339$
Time 1	4.45	4.71	4.77	4.85	4.70
	(1.46)	(1.46)	(1.53)	(1.50)	(1.49)
	$n = 69^b$	$n = 63$	$n = 54^b$	$n = 62$	$N = 248$
Time 2	4.18	4.80	4.71	4.80	4.61
	(1.64)	(1.58)	(1.76)	(1.47)	(1.62)
	$n = 48$	$n = 42^b$	$n = 36$	$n = 35^b$	$N = 161$
Time 3	4.21	4.86	4.67	4.66	4.58
	(1.85)	(1.87)	(1.89)	(1.66)	(1.82)
Expectancies[a]					
	$n = 84$	$n = 87$	$n = 79$	$n = 89$	$N = 339$
Time 1	0.59	0.58	0.59	0.61	0.59
	(0.09)	(0.11)	(0.08)	(0.13)	(0.10)
	$n = 69^b$	$n = 63$	$n = 54^b$	$n = 62$	$N = 248$
Time 2	0.55	0.58	0.61	0.62	0.59
	(0.13)	(0.16)	(0.10)	(0.09)	(0.13)
	$n = 48$	$n = 42^b$	$n = 36$	$n = 35^b$	$N = 161$
Time 3	0.58	0.58	0.60	0.60	0.59
	(0.08)	(0.12)	(0.09)	(0.13)	(0.11)

Note. Standard deviations are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers. [b]The drop in n is due to missing data.

In the longitudinal analyses, there was a significant main effect of self-affirmation on expectancies, $F(1, 155) = 4.88$, $p = .029$, $\eta p^2 = .03$, with self-affirmed participants having greater expectancies than non-affirmed participants (Table 45). The effect of time on both intentions, $F(2, 310) = 1.17$, $p = .311$, $\eta p^2 = .008$ ($M_{TIME1} = 4.72$, $SD = 0.12$; $M_{TIME2} = 4.58$, $SD = 0.14$; $M_{TIME3} = 4.59$, $SD = 0.15$), and expectancies, $F(2, 310) < 1$ ($M_{TIME1} = 0.60$, $SD = 0.01$; $M_{TIME2} = 0.59$, $SD = 0.01$; $M_{TIME3} = 0.59$, $SD = 0.01$), was not significant.

Table 45.

*Adjusted Means and Standard Errors for Scores on Expectancies for Non-Affirmed and
Self-Affirmed Participants*

Variable	Non-Affirmed	Self-Affirmed	Full Sample
	$n = 90^b$	$n = 69^b$	$N = 159$
Expectancies[a]	0.58	0.61	0.60
	(0.01)	(0.01)	(0.01)

Note. Standard errors are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers. [b]The drop in *n* is due to missing data.

To test whether self-affirmation affected the extent to which expectancies were more or less realistic, scores on the typical daily fruit and vegetable consumption at Time 2 and 3 were subtracted from scores on the expectancies about typical daily fruit and vegetable consumption at Time 1 and 2, respectively, meaning that optimistic expectancies corresponded to positive scores. Using one-sample t-tests, the means for non-affirmed, $t = 0.79$, $df = 132$, $p = .432$, and self-affirmed, $t = 0.62$, $df = 117$, $p = .534$, participants for the Time 1 expectancies-Time 2 consumption difference did not differ significantly from zero. Similarly, the means for non-affirmed, $t = 1.86$, $df = 90$, $p = .066$, and self-affirmed, $t = 0.34$, $df = 69$, $p = .732$, participants for the Time 2 expectancies-Time 3 consumption difference did not differ significantly from zero (Table 46). These results suggest that participants across the groups had realistic expectancies about their future fruit and vegetable consumption.

Table 46.

Means and Standard Deviations for Difference Scores Representing Optimism of Expectancies at Time 1 and 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Difference scores[a]			
	$n = 133$	$n = 118$	$N = 251$
Time 1	-0.01	0.01	0.00
	(0.10)	(0.11)	(0.11)
	$n = 91$	$n = 70$[b]	$N = 161$
Time 2	-0.03	0.01	-0.01
	(0.14)	(0.12)	(0.13)

Note. Standard deviations are in parentheses. [a]Scores of the minuend and subtrahend were log-transformed to reduce the impact of outliers. [b]The drop in *n* is due to missing data.

Self-Regulatory Processes

Data on action control and perceived self-regulatory success were analysed using a two-way, between-participants MANOVA (Wilk's Lambda), with the independent variables of self-affirmation (non-affirmed, self-affirmed) and implementation intentions (no implementation intentions, implementation intentions). Action control and perceived self-regulatory success were significantly positively correlated at Time 2, $r(248) = 0.62$, $p < .001$, and Time 3, $r(161) = 0.71$, $p < .001$, indicating that it was appropriate to analyse these variables in a MANOVA.

There was no significant multivariate main effect of self-affirmation on self-regulatory processes at either Time 2, $F(2, 243) = 2.38$, $p = .095$, $\eta p^2 = .019$, or Time 3, $F(2, 156) < 1$. Neither the main effects of implementation intentions at Time 2, $F(2, 243) = 1.34$, $p = .263$, $\eta p^2 = .011$, or Time 3, $F(2, 156) < 1$, nor the self-affirmation x implementation intention interaction, at Time 2, $F(2, 243) < 1$, or Time 3, $F(2, 156) = 1.37$, $p = .258$, $\eta p^2 = .017$, were significant (Table 47).

Table 47.

Means and Standard Deviations for Scores on Self-Regulatory Processes at Time 2 and 3

Variable	Non-Affirmed		Self-Affirmed		Full Sample
	No Implementation Intentions	Implementation Intentions	No Implementation Intentions	Implementation Intentions	
Action control					
	$n = 69^a$	$n = 63$	$n = 54^a$	$n = 62$	$N = 248$
Time 2	3.59	3.92	4.15	4.08	3.92
	(1.36)	(1.57)	(1.53)	(1.46)	(1.48)
	$n = 48$	$n = 42^a$	$n = 36$	$n = 35^a$	$N = 161$
Time 3	3.37	3.97	4.11	3.84	3.80
	(1.66)	(1.64)	(1.69)	(1.70)	(1.68)
Perceived self-regulatory success					
	$n = 69^a$	$n = 63$	$n = 54^a$	$n = 62$	$N = 248$
Time 2	3.37	3.71	3.79	4.08	3.72
	(1.41)	(1.51)	(1.76)	(1.52)	(1.56)
	$n = 48$	$n = 42^a$	$n = 36$	$n = 35^a$	$N = 161$
Time 3	3.28	3.81	3.93	3.73	3.66
	(1.62)	(1.79)	(1.77)	(1.73)	(1.72)

Note. Standard deviations are in parentheses. [a]The drop in *n* is due to missing data.

Mediation

To test whether expectancies at Time 2 mediated the effect of self-affirmation on fruit and vegetable consumption at Time 3, bootstrapping procedures (5,000 samples) were run to compute a confidence interval around the indirect effect (i.e., the path through the mediator; Preacher & Hayes, 2008). If zero falls outside this interval, the third variable mediates the effect of the independent variable on the outcome.

Self-affirmation condition was entered along with Time 2 expectancies and baseline consumption as a covariate. The paths from self-affirmation to Time 2 expectancies, $B = 0.05$, $SE = 0.02$, $t = 2.78$, $p = .006$, and Time 2 expectancies to Time 3 consumption, $B = 0.09$, $SE = 0.04$, $t = 2.01$, $p = .046$, were significant. The significant effect of self-affirmation condition on Time 3 consumption, $B = 0.03$, $SE = 0.01$, $t = 2.66$, $p = .009$, was reduced when Time 2 expectancies were controlled, $B = 0.02$, $SE = 0.01$, $t = 2.19$, $p = .030$. The results revealed that the indirect effect via Time 2

expectancies equalled 0.005, $SE = 0.003$, 95% $CI = 0.0003\text{-}0.0122$. The fact that zero fell outside the confidence interval indicated a significant mediation effect of Time 2 expectancies on the relationship between self-affirmation and Time 3 consumption.

Discussion

The principal aim of the study was to investigate whether factors that create the intention-behaviour gap can account for the limited success of self-affirmation in promoting health-related behaviour. This was achieved by testing whether supplementing a self-affirmation manipulation and a health message with implementation intentions would increase the likelihood of a longer-term health behaviour change compared to a combination of a self-affirmation manipulation with a health message and a health message alone. The secondary aim of the study was to carry on investigating potential mechanisms underlying the effects of self-affirmation on health-related behaviour, such as expectancies and self-regulatory processes. To fulfil these aims, a typical self-affirmation study was extended with an implementation intention manipulation. The targeted health-related behaviour was the same as that used in Study 1 and 2 (i.e., fruit and vegetable consumption), but a longer follow-up (3 months) than that used in the previous studies (7 days and 1 month) was included alongside a 7-day follow-up in recognition that short-term changes in eating behaviour, while necessary steps in changing health behaviour, are unlikely to produce substantial health gains. It was hypothesised that as the complexity of the intervention increases, so would the cognitive and behavioural outcomes.

It was observed that self-affirmation in the presence of a health message caused greater consumption of fruit and vegetables at the 7-day and 3-month follow-ups, with implementation intentions building on these effects at the 7-day follow-up. The effects of self-affirmation on consumption were also significant in both the longitudinal and

intention-to-treat analyses, which were more conservative in nature: the former due to participant attrition and the latter due to the use of the baseline mean fruit and vegetable consumption for data missing at the follow-ups. Thus, the study not only replicated, but also extended the findings of Epton and Harris's (2008) study, which was the first published study to demonstrate evidence of actual health behaviour change in self-affirmed participants. Specifically, in both studies, self-affirmation increased fruit and vegetable consumption at the 7-day follow-up; however, in the current study, the increase was also sustained after 3 months, which constitutes one of the longest periods of health behaviour change reported in the self-affirmation literature.

The synergistic effects (i.e., the interaction) between self-affirmation and implementation intention manipulations observed at the 7-day follow-up is evidence in support of the idea that self-affirmation might prepare people to form (Ferrer et al., 2012) and act on (Wakslak & Trope, 2009) implementation intentions. The more complex intervention, however, ceased to have an effect at the longer 3-month follow-up. This observation might be due to the fact that implementation intentions in the current study aimed primarily to promote the initiation of health-related behaviour (5 plans, e.g., **<u>If</u>** it is Monday each week, **<u>then</u>** I will cook a vegetable curry for dinner, and if I don't know how, I will find a recipe the next time I'm on the Web!), rather than its maintenance (2 plans, e.g., **<u>If</u>** I start to talk myself out of eating fruit and vegetables: "They take too much time to prepare; they don't taste good; I don't like eating them, **<u>then</u>** I will tell myself: "No excuses, this is the right thing to do"!) Indeed, recent research literature suggests that forming multiple implementation intention plans that specify not only actions to be taken, known as "action plans", but also strategies to be applied in the face of difficulties, known as "coping plans", enhances the likelihood of

the successful enactment of implementation intentions (Wiedemann, Lippke, Reuter, Ziegelmann, & Schwarzer, 2011; Wiedemann, Lippke, & Schwarzer, 2012).

While the classic models of behaviour and health behaviour postulate that intentions mediate behaviour, in the current study this effect was not observed. Having said that, it was found that a measure of motivation closely related to intentions, namely expectancies, partially mediated the relationship between self-affirmation and behaviour. Compared to the non-affirmed group, the self-affirmed group formed more positive but still realistic expectancies about their future fruit and vegetable consumption at the 7-day follow-up; these then influenced their fruit and vegetable consumption at the 3-month follow-up. Although in the explanatory analyses self-affirmation did not have a significant effect on expectancies immediately post manipulation or after 3 months, its effect on expectancies after 7 days was strong enough to render the longitudinal analysis statistically significant. Despite not being entirely perfect, the temporal sequence of events observed in the current study – intervention-expectancies-behaviour – gives more credibility to the mediation analysis. The findings of the impact of expectancies on health-related behaviour are evidence that the classic models of behaviour might not always capture the nuances of motivation produced after self-affirming. It appears that sometimes a better prediction of behaviour in self-affirmation studies might be achieved by using measures of motivation that indicate planning tempered by the reality constraints, such as expectancies, rather than measures indicating merely planning, such as intentions (Warshaw & Davis, 1985). This should especially be true for studies aiming at health promotion, as health behaviour change normally requires effort and persistence on top of plans to execute behaviour. Of note, the two self-regulatory processes, namely action control and perceived self-regulatory success, postulated to be behind the effects of self-affirmation

during the volitional stage of health behaviour change (as discussed in Study 1), did not work in concert with expectancies and remained unaffected by self-affirmation. This is additional evidence that self-affirmation does not exhibit its effects on behaviour through the self-regulatory processes in question.

The interpretation of the findings above, however, should be tempered by the recognition of their limited generalisability, with some limitations being more problematic than others. Among the less problematic limitations is the fact that the ineligible participants were older and more likely to be a female and a member of the university staff rather than a student. These characteristics are consistent with the tendencies of younger people and men to consume less fruit and vegetables than older people and women (Health & Social Care Information Centre, 2011). Another lesser problem is the younger age of participants who completed Time 1 measures relative to those who started but did not complete them, as the age difference amounted to only 1.30 years, which is a difference of small practical significance. Yet another lesser problem is the use of the self-report measures of consumption, which (as discussed in Study 2) are less reliable than the objective measures of behaviour (e.g., biological markers). In common with the previous studies in the thesis, this problem was overcome to some degree by the use of several measures of fruit and vegetable consumption that assessed consumption on different measuring scales and during different time periods.

Among the more problematic limitations is the fact that around a quarter of participants who underwent their respective interventions was lost at the 7-day follow-up and around half at the 3-month follow-up. Such levels of participant attrition might pose a problem to the external validity of the findings due to the sample being not representative of the population it has been drawn from (Amico, 2009).

Notwithstanding, the attrition was homogenous across conditions and was to some extent due to the limited incentive (a prize draw of £450) for participation at all stages of the study. Further, participants who saw through the entire study were more likely to be women and their baseline fruit and vegetable consumption was higher relative to participants completing measures at Time 1 only. These are, however, limitations shared with other self-affirmation studies. This is because, firstly, women are more typical participants in health-related self-affirmation research (Harris & Epton, 2009). Secondly, in the pioneer study that found increased fruit and vegetable consumption in the self-affirmed group (Epton & Harris, 2008) participants similarly started out with a higher than average baseline consumption (in both studies consumption was controlled for in the statistical analyses of behaviour). Despite these limitations, the randomisation to condition was successful, with no differences between conditions being identified either on the demographic variables or on the baseline measure of fruit and vegetable consumption. Moreover, relative to the non-affirmed participants, the self-affirmed participants reported more positive affect after the self-affirmation manipulation, the effect found to be produced by self-affirmation in previous research (Crocker et al., 2008; Sherman et al., 2000, Study 1), which gives more confidence in the success of the manipulation.

In conclusion, despite some limitations, Study 3 observed one of the longest health behaviour changes to date as a result of a health intervention involving self-affirmation; a positive interactive effect of self-affirmation and implementation intentions on behaviour; and gave insights into potential mechanisms, namely expectancies, underlying the behavioural effects of self-affirmation. The effect of self-affirmation on fruit and vegetable consumption not only replicated, but also extended Epton and Harris's (2008) study in several respects: experimental settings (online vs.

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laboratory), participants (males and females vs. females only) and consumption measures (multiple vs. single). This is the second demonstration of the ability of self-affirmation to promote fruit and vegetable consumption in the current thesis, suggesting that the effects of self-affirmation do not inevitably fall prey to the intention-behaviour gap. Moreover, when fortified with implementation intentions, self-affirmation in the presence of a health message might produce even greater effects on health behaviour, at least in the short run.

A lack of effects on intentions in the studies in the thesis so far, the success of Study 2 in promoting a longer-term health behaviour change, and a partial mediation of the relationship between self-affirmation and behaviour by expectancies in the current study, suggest that a further search for potential mechanisms underlying the effects of self-affirmation on behaviour is warranted. Firstly, there is a need for more evidence of the mediating role of expectancies on the relationship between self-affirmation and behaviour, as the current study is the only one to report such mediation. Secondly, given that the mediation of the relationship between self-affirmation and behaviour was partial, further research of constructs that might mediate this relationship is in order. Behavioural reasoning theory (Westaby, 2005) offers such potential construct, namely reasons given for behaviour, which form the primary focus of the next study in the thesis.

CHAPTER FIVE

Study 4

Exploring the Effects of Self-Affirmation on Reasons Given for Fruit and Vegetable Consumption

Study 3 found that self-affirmation partially exerts its effects on behaviour through expectancies. This has left room for the exploration of additional potential mediators, with the emphasis being on novel constructs, since no consistent results have emerged in the tests involving constructs accounted for by the classic TPB (Ajzen, 1991), the most often-used theoretical framework of behaviour in self-affirmation research. One such potential novel mediator is reasons for behaviour from Behavioural Reasoning Theory (BRT, Westaby, 2005), an extended version of the TPB. As reasons for behaviour were found to directly affect not only intentions but also behaviour (Westaby, 2005, Study 1), this construct fits well with the set of results obtained in Study 2 and 3 of the thesis: enhanced behaviour despite a lack of effects on intentions. Therefore, Study 4 aims, primarily, to establish whether self-affirmation has an effect on reasons given for behaviour and, if so, their role in mediating the relationship between self-affirmation and behaviour. Secondarily, it aims to carry on investigating the effects of self-affirmation on some of the constructs used in the previous studies in order to replicate the results obtained so far whether significant (expectancies, moral norm) or not significant (two-component TPB and action control).

The Outline of Behavioural Reasoning Theory

While abiding by the principle of parsimony (i.e., theories should be as "simple as possible", Dennis & Kintsch, 2007, p. 151), Ajzen (1991), the originator of the TPB, welcomes extensions to the theory, provided that they can explain a meaningful amount of additional variance in intentions or behaviour. Put forward by Westaby (2005), BRT

is an integrative theoretical framework of behaviour that is built on the basis of the TPB. Among the premises shared by the two theories is the pivotal role of intentions in predicting behaviour, with intentions being its most proximal precursor. Both theories similarly postulate that intentions are, in their turn, predicted by global motives, such as attitude, subjective norm and perceived behavioural control. Where the two theories differ is that BRT additionally postulates that reasons for and against behaviour, defined as "the specific subjective factors people use to explain their anticipated behaviour" (Westaby, 2005, p. 100) and stemming from people's beliefs and values, directly predict the global motives, as well as intentions alongside the global motives. The global motives, however, are not necessarily affected by reasons and, in cases where automatic processing wins over deliberative processing, could be based directly on beliefs and values that people have. Once behaviour is performed, the strengthening of reasons would be observed due to the post hoc processing of reasons in order to "support, distort, or rationalize behavior" (Westaby, 2005, p. 99).

Rationale behind Behavioural Reasoning Theory

Westaby (2005) makes the case for BRT by arguing that reasons are qualitatively different from global motives and beliefs in the TPB. As regards global motives, they are considered as "more general drivers of people's behaviour", as opposed to reasons, which explain behaviour in a specific context (Norman, Conner, & Stride, 2012, p. 683). To illustrate the distinction between reasons and global motives, a person can have a positive attitude towards eating a diet rich in fruit and vegetables, but his or her reason for not doing so in the next week might be a lack of time needed to prepare them for eating. As regards beliefs, while they are contextualised similarly to reasons, they are not necessarily used to explain behaviour, whereas reasons are (Westaby & Braithwaite, 2003). To illustrate the distinction between beliefs and

reasons, a person might believe that eating fruit and vegetables would result in him or her having lower chances of developing cardiovascular disease and other chronic conditions in the future but not use this belief to explain why he or she does not engage in this behaviour. Instead, his or her reason for not doing so might be that he or she does not like the taste of fruit and vegetables. Having drawn these distinctions, it is necessary to note that reasons are linked to both global motives and beliefs. Specifically, reasons arise from people's beliefs (and values) and have an effect on the global motives due to the need of people to feel that they are worthy individuals whose behaviour is "adaptively and morally adequate", or, in other words, rational (Steele, 1988, p. 262, discussed in Chapter 1). To this end, people want to be able to justify their behavioural choices even in the face of discrepancies with their initial decisions. For example, Steele, Spencer and Lynch (1993) found that when participants were first asked to rank how desirable 10 popular music albums were and then offered either the 5th or 6th of them as a gift, their subsequent ranking of the chosen album among the same 10 albums increased. Indeed, people's need for justification of their behavioural decisions is so persistent that it tempers their tendency to believe what they want to believe (Kunda, 1990, discussed in Chapter 1).

Empirical Evidence for Behavioural Reasoning Theory

Empirical support for the predictive validity of BRT comes primarily from research in Occupational Psychology. For example, Westaby, Probst and Lee (2010) found that, compared to the TPB, BRT had a greater ability to predict decisions regarding youth employment by senior executive staff with control over workforce employment, with reasons explaining additional variance in intentions on top of attitude, subjective norm and perceived behavioural control. To date, there has been only a single venture into applying BRT to health. Specifically, Norman et al. (2012)

demonstrated that BRT can successfully predict binge drinking cognitions and behaviour in students, with the BRT constructs of attitude and reasons for behaviour included alongside past behaviour explaining 80% of variance in intentions to engage in binge drinking and the BRT constructs of perceived behavioural control and intentions included alongside past behaviour explaining 34% of variance in the actual binge drinking behaviour at the 7-day follow-up. These are promising findings for research into the development of health interventions, since reasons for behaviour can be purposefully addressed in a health message, which might promote motivation to engage in health-related behaviour. Moreover, interventions of this type could potentially affect health-related behaviour directly, given that Westaby (2005, Study 1) found a direct effect of reasons on behaviour in the occupational setting. Specifically, reasons given by employees for leaving the current workplace directly predicted their behaviour at the 5-month follow-up.

Behavioural Reasoning Theory and Health Behaviour Change

The potential of BRT to be applied to health promotion is further highlighted by Westaby's (2005) suggestion that, while reasons are strengthened after the performance of behaviour, they are also critical for behaviour change, and more so, under conditions that challenge present psychological functioning. Specifically, when people encounter information that they think to be irreconcilable with their reasons for behaviour, they may suspend that behaviour. This is because the reasons they hold cannot handle the challenges posed by the new information, which makes people question their current behaviour and their future intentions regarding that behaviour. To put this proposition into the context of health behaviour change, the irreconcilable information could be a threatening health message that links a diet poor in fruit and vegetables to the increased chances of developing cardiovascular disease and other chronic conditions. One way to

respond to such information would be to include fruit and vegetables in a diet, presumably through the acceptance of reasons promoting such a diet. Another, and more likely way among those not engaging in the target health-related behaviour, would be to dismiss the health message by rationalising current behaviour due to the defensive processing of uncongenial health information (Croyle et al., 1997). Self-affirmation has been shown to lift such undesirable reactions by promoting the acceptance of a health message (e.g., van Koningsbruggen et al., 2009), motivation to enact the target health-related behaviour (e.g., Jessop et al., 2009) and even actual health-related behaviour (Epton & Harris, 2008; Study 2 and 3 of the current thesis). However, despite the attempts to uncover the mechanisms underlying these effects, they remain unclear (Harris & Epton, 2009), with any novel potential theory-based mechanisms, such as reasons for and against behaviour from BRT, being welcome.

The Current Study

To research the issues outlined above, Study 4 aimed to test the effect of self-affirmation on (a) measures of constructs related to fruit and vegetable consumption from BRT. Additionally, the study aimed to investigate the effect of self-affirmation on (b) measures of fruit and vegetable consumption and (c) the mediating effect of reasons for and against fruit and vegetable consumption on the relationship between self-affirmation and behaviour. To provide corroborating evidence for the presence or lack of some effects of self-affirmation researched in the previous studies of the thesis, the BRT was based on the two-component TPB alongside which measures of expectancies, moral norm and action control (discussed in Study 1 and 2) were included. The current study was based on the usual experimental framework for self-affirmation research but was extended with a pilot study to develop measures of reasons for and against fruit and vegetable consumption (as recommended by Westaby, 2005).

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In the pilot study, participants listed any reasons for and against fruit and vegetable consumption that they could think of. In the main study, participants reported their baseline fruit and vegetable consumption, were either self-affirmed or non-affirmed, read a health message about fruit and vegetable consumption, completed measures of reasons for/against fruit and vegetable consumption, measures of constructs from BRT based on the two-component TPB, expectancies and moral norm related to fruit and vegetable consumption, and after 7 days reported their feelings of action control related to fruit and vegetable consumption and actual fruit and vegetable consumption. It was hypothesised that, compared to non-affirmed participants, self-affirmed participants would (a) endorse more reasons for eating at least 5 fruit and vegetables every day and consider them to be more important as opposed to reasons against and show (b) stronger intentions and their predictors, (c) more positive but realistic expectancies, (d) stronger feelings of moral norm, and, at the 7-day follow-up, (e) stronger feelings of action control and (f) greater fruit and vegetable consumption.

Pilot Study

Method

Design

The study had a one-way, between-participants experimental design, with the manipulated independent variable of reason order (reasons for followed by reasons against eating at least 5 portions of fruit and vegetables every day ["reasons for 1st"]; reasons against followed by reasons for eating at least 5 portions of fruit and vegetables every day ["reasons against 1st"]; see Table 48). The principal dependent variable was the reasons listed for and against eating at least 5 portions of fruit and vegetables every day.

Table 48.

The Order of Presentation of Reasons in Reason Order Conditions

Reason Condition	Reason Order	
Reasons for 1st	For	Against
Reasons against 1st	Against	For

Participants

Participants were recruited from a pool of first year undergraduate Psychology students to take part in a study concerned with reasons for and against eating fruit and vegetables in exchange for being rewarded with one credit. Twenty participants comprised the study sample. The sample had a mean age of 19.85 years ($SD = 3.07$, range 18-29 years) and consisted predominately of females (75.0%, $n = 15$), and people who described themselves as being of white Caucasian origin (80.0%, $n = 16$)[16].

Materials

Pre-test measures included demographic questions about age, sex and ethnicity, information about fruit and vegetable portion sizes, and measures of reasons for/against eating at least 5 portions of fruit and vegetables every day. The measures of *reasons for* were preceded by the following instructions: "Please think about the reasons you might have for eating at least 5 portions of fruit and vegetables every day" and "Please list as many reasons for eating at least 5 portions of fruit and vegetables every day you can think of". Similar instructions were given for eliciting *reasons against*. A space of 10 lines was provided below both sets of reasons.

Procedure

The study was run online. Participants were randomly assigned to either reasons for 1st or reasons against 1st condition. It started with informed consent for participation and the information about fruit and vegetable portion sizes before continuing to the

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[16] The remaining participants described themselves as of Asian (15.0%, $n = 3$) or mixed (5.0%, $n = 1$) ethnic origin.

reasons for/against or against/for eating at least 5 portions of fruit and vegetables every day. The study concluded with demographic questions and a debriefing procedure.

Results

Randomisation Checks

To determine the success of randomisation to conditions, age, sex and ethnicity were analysed using a one-way, between-participants ANOVA, with the independent variable of reason order.[17] Participants in the reasons for 1st and reasons against 1st conditions did not differ in age, $F(1, 18) = 1.28$, $p = .273$, $\eta p^2 = .066$, sex, $F(1, 18) < 1$, or ethnicity, $F(1, 18) < 1$.

Altogether participants generated 170 reasons, of which 100 were reasons for and 70 were reasons against eating at least 5 portions of fruit and vegetables every day. These data were subjected to one-way, between-participants ANOVAs that revealed no differences in the number of reasons for, $F(1, 18) = 3.56$, $p = .075$, $\eta p^2 = .165$, against, $F(1, 18) < 1$, or their combination, $F(1, 18) = 1.55$, $p = .229$, $\eta p^2 = .079$, between participants in the two reason order conditions (Table 49). Given the similarity between the two groups on the demographic and reason measures, the reason data were collapsed across conditions for the purposes of generating reason items.

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[17] A violation of the expected cell count assumption prevented a Chi-square analysis from being run on sex and ethnicity.

Table 49.
Pilot Sample Characteristics

Variable	Reasons for 1st	Reasons against 1st	Full Sample
Demographics	$n = 9$	$n = 11$	$N = 20$
Age	19.00	20.55	19.85
	(1.12)	(3.96)	(3.07)
Sex[a]	0.67	0.82	0.75
	(0.50)	(0.41)	(0.44)
Ethnicity[b]	1.22	1.45	1.35
	(0.67)	(0.82)	(0.75)
Reasons			
For	4.33	5.55	5.00
	(1.73)	(1.13)	(1.52)
Against	3.56	3.45	3.50
	(0.73)	(1.44)	(1.15)
Combined	7.89	9.00	8.50
	(1.97)	(2.00)	(2.01)

Note. Means with standard deviations in parentheses. [a]Scored: male = 0, female = 1. [b]Scored: white = 1, mixed = 2, Asian = 3.

Reason Items

The reasons generated by participants were categorised by two raters: the researcher and an independent rater. Overall inter-rater reliability was 85.7%, with 87.0% for reasons for and 84.3% for reasons against eating at least 5 portions of fruit and vegetables every day. Reasons for and against generated by more than 75.0% of participants were chosen for the main study and were developed into reason items. This resulted in 6 reasons for, namely, "because it would be good for my health", "because it would provide me with vitamins, minerals and other nutrients", "because it would make my diet more balanced", "because it would help me prevent some illnesses", "because I like the taste of fruit and vegetables", "because it would be easy to do" and 4 reasons against, namely, "because it would be too expensive", "because it would be too time consuming to do", "because it would be too difficult to do", "because I don't like the taste of fruit and vegetables.

<center>**Main Study**</center>

<center>**Method**</center>

Design

The study had a two-way, between-participants experimental design, with the manipulated independent variables of self-affirmation (non-affirmed, self-affirmed) and reason order (reasons for 1st, reasons against 1st). The order of presentation of reasons in the two reason order conditions was the same as in the pilot study (Table 48). Among the principal dependent variables were the number and the ratings of strength of reasons for and against eating at least 5 portions of fruit and vegetables every day, plus measures of intentions to consume fruit and vegetables and their predictors from BRT based on the two-component TPB, expectancies and moral norm related to fruit and vegetable consumption, and measures of action control and self-reported fruit and vegetable consumption taken after 7 days.

Participants

Participants were recruited by email from a pool of research staff and graduate and undergraduate students to take part in a study of diet and health beliefs in exchange for being entered into a prize draw for £100 (2 awards of £25 and 1 award of £50). Six hundred and eighty-five participants attempted pre-test measures, of these 326 were randomised to conditions. Among those randomised, 249 (76.4%) completed Time 1 measures and comprised the Time 1 sample. This sample was characterised by a mean age of 22.68 years ($SD = 6.72$, range 18-58 years) and consisted predominately of students (94.0%, $n = 234$), females (72.7%, $n = 181$), and people who described

themselves as of white Caucasian origin (84.7%, $n = 211$).[18] Of the Time 1 sample, $n = 156$ (62.7%) were retained at Time 2, the 7-day follow-up, (Figure 9).

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                        ┌─────────────────────┐
                        │   Assessed on       │
                        │ Pre-test Measures   │
                        │    N = 685          │
                        │ Did not Complete    │
                        │    n = 78           │
                        └─────────────────────┘
                                 │              ┌──────────────────┐
                                 ├──────────────│   Lost to        │
                                 │              │ Randomisation    │
                                 │              │   n = 281        │
                                 │              └──────────────────┘
                        ┌─────────────────────┐
                        │  Randomised To      │
                        │   Condition         │
                        │    n = 326          │
                        └─────────────────────┘
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	Non-Affirmed Reasons For 1st	Non-Affirmed Reasons Against 1st	Self-Affirmed Reasons For 1st	Self-Affirmed Reasons Against 1st
Time 1	Analysed $n = 72$ Did not Complete $n = 18$	Analysed $n = 62$ Did not Complete $n = 17$	Analysed $n = 64$ Did not Complete $n = 26$	Analysed $n = 51$ Did not Complete $n = 16$
7 Days	Analysed $n = 40$ Lost to Follow-up $n = 32$	Analysed $n = 41$ Lost to Follow-up $n = 21$	Analysed $n = 37$ Lost to Follow-up $n = 27$	Analysed $n = 38$ Lost to Follow-up $n = 13$

Figure 9. Participant flow through Study 4.

Materials

Pre-test measures. Pre-test measures included demographic questions about sex, age and occupation, information about fruit and vegetable portion sizes and measures of fruit and vegetable consumption for a typical day (Steptoe et al., 2003, detailed in Study 1), the last 24 hours (Bingham et al., 1994, detailed in Study 2) and a typical week (Wardle et al., 2000, detailed in Study 1). After standardisation, the three measures of fruit and vegetable consumption had between them reasonably high internal reliability ($\alpha = .76$) and were combined into a single measure of baseline consumption before being log-transformed.

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[18] The remaining participants described themselves as of Asian (7.2%, $n = 18$), mixed (3.2%, $n = 8$), black (0.8%, $n = 2$), other (2.4%, $n = 6$) ethnic origin, or withheld information (1.6%, $n = 4$).

Self-affirmation manipulation. The self-affirmation manipulation was the same as that used in Study 1.

Self-affirmation manipulation checks and potential mediators. The value importance self-affirmation manipulation check (Cerully, 2011, $\alpha = .97$) and measures of potential mediators, such as positive other-related affect (Crocker et al., 2008; $\alpha = .86$) and positive affect (Aarts & Dijksterhuis, 2003, $\alpha = .66$ improved to $\alpha = .73$ after the exclusion of one item) were the same as those used in Study 1. The retrospective self-affirmation manipulation check items (Napper et al., 2009, $\alpha = .83$) were the same as those used in Study 2.

Health message. The health message was the same as that used in Study 1.

Principal dependent variables. Reasons for/against eating at least 5 portions of fruit and vegetables every day identified in the pilot study were preceded with an instruction to consider whether they were (for the participant) reasons for/against eating at least 5 fruit and vegetables every day in the next 7 days and how strong these reasons were. *Reason for* items followed the stem "The reasons for my eating at least 5 fruit and vegetables every day in the next 7 days" and included 6 items ($\alpha = .74$), e.g., "because it would be good for my health", answered on a 6-point scale (0, *not a reason*, 5, *extremely strong reason*). *Reason against* items followed the stem "The reasons against my eating at least 5 fruit and vegetables every day in the next 7 days" and included 4 items ($\alpha = .35$), e.g., "because it would be too expensive", answered on a 6-point scale (0, *not a reason*, 5, *extremely strong reason*).[19] To record any reasons for/against that were not on the list but that were important to a participant, a space was provided below both sets of reason measures. This was followed by a full list of

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[19] Although both reasons for and against ranged in scope, reasons for were predominantly focused on health, while reasons against lacked a particular focus, making the low reliability of the latter not unexpected.

reasons for and against eating at least 5 portions of fruit and vegetables every day presented in a random order, among which participants were instructed to choose the 5 most important reasons to them.

Intentions, *expectancies* and *the predictors of intentions* were assessed on the measures of constructs from the two-component TPB used in Study 1. These measures were supplemented with the fourth item of intentions and measures of moral norm. The additional *intention* item was "I intend eating __ portion(s) of fruit and vegetables every day in the next 7 days" (0/1/2/3/4/5/5+). *Moral norm* was measured by three items (adapted from Godin, Bélanger-Gravel, Vézina-Im, Amireault, & Bilodeau, 2012, αs $\geq$. 74), "I feel morally obliged to eat at least 5 fruit and vegetables every day in the 7 days", "Eating at least 5 fruit and vegetables every day in the next 7 days would be in line with my personal values", and "Eating at least 5 fruit and vegetables every day in the next 7 days is for me a question of principle" (1, *definitely no*, 7, *definitely yes*). Apart from the measures of injunctive norm (αs $\geq$ .69) and expectancies (αs $\geq$ .46), all the measures had high internal reliability: intentions (αs $\geq$ .94), affective attitudes (αs $\geq$ .83), cognitive attitudes (αs $\geq$ .81), descriptive norm (αs $\geq$ .88), perceived control (αs $\geq$ .92) and self-efficacy (αs $\geq$ .89). The internal reliability of the injunctive norm was improved (αs $\geq$ .89) by excluding the item, "People who are important to me would disapprove/approve of me eating at least 5 portions of fruit and vegetables every day in the next 7 days" (1, *disapprove*, 7, *approve*), and the shorter list of measures was used in the analyses.

Follow-up measures. The measures of fruit and vegetable consumption (αs $\geq$ .67), constructs from BRT based on the two-component TPB, expectancies and moral norm were taken again after 7 days. Additionally, the follow-up measures included the retrospective *action control* measures (Sniehotta et al., 2006; α = .93) used in Study 2.

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Procedure

The procedure was similar to that detailed in Study 1, except that the current study was run entirely online, eligibility items were not used, participants did not work on the SC-IAT task but instead were randomised to respond to the reason items in either the reasons for/against or against/for order.

Results

Preliminary Checks

There were no differences between participants who followed the link to the Time 1 measures ($n = 326$) and those who did not ($n = 359$) in age, $F(1, 683) < 1$, sex, $\chi^2(1, N = 685) = 3.11$, $p = .078$, occupation (collapsed into categories of "not student" and "student" to meet the requirement for the expected cell count), $\chi^2(1, N = 685) = 0.17$, $p = .679$, or on the baseline measure of fruit and vegetable consumption, $F(1, 539) < 1$, (Table 50).

Table 50.
Characteristics of Participants Who Did Not Follow and Followed the Link to Time 1 Measures

Variable	Did Not Follow Link	Followed Link	Full Sample
	$n = 359$	$n = 326$	$N = 685$
Age	22.11	22.57	22.33
	(6.15)	(6.60)	(6.37)
Sex			
Male	118	87	205
Female	241	239	480
Occupation			
Not student	26	21	47
Student	333	305	638
	$n = 215$	$n = 326$	$N = 541$
Baseline consumption (z scores)[a, b]	0.60	0.59	0.59
	(0.09)	(0.08)	(0.09)

Note. Unless specified, means with standard deviations in parentheses. [a]Scores were log-transformed to reduce the impact of outliers. [b]A drop in participant number is due to the attrition of participants before completing the full set of pre-test measures.

Participants who completed Time 1 measures ($n = 249$) did not differ from participants who started but did not complete Time 1 measures ($n = 77$) in age, $F(1, 324) < 1$, sex, $\chi^2(1, N = 326) = 0.21$, $p = .648$, occupation (collapsed as above), $\chi^2(1, N = 326) = 0.31$, $p = .581$, or on the baseline measure of fruit and vegetable consumption, $F(1, 324) < 1$, (Table 51).

Table 51.
Characteristics of Participants Who Did not Complete and Completed Time 1 Measures

Variable	Did Not Complete	Completed	Full Sample
	$n = 77$	$n = 249$	$N = 326$
Age	22.21	22.68	22.57
	(6.23)	(6.72)	(6.60)
Sex			
Male	19	68	87
Female	58	181	239
Occupation			
Not student	6	15	21
Student	71	234	305
Baseline consumption (z scores)[a]	0.59	0.60	0.59
	(0.08)	(0.08)	(0.08)

Note. Unless specified, means with standard deviations in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

There were no differences between participants who completed only Time 1 measures ($n = 93$) and those who completed measures at the two time points ($n = 156$) in age, $F(1, 247) = 1.49$, $p = .224$, $\eta p^2 = .006$, sex, $\chi^2(1, N = 249) = 0.59$, $p = .444$, occupation (collapsed as described above), $\chi^2(1, N = 249) = 0.48$, $p = .827$, or on the baseline measures of fruit and vegetable consumption, $F(1, 247) < 1$, (Table 52).

Table 52.

Characteristics of Participants Who Completed Time 1 Only and Time 1 and 2 Measures

Variable	Completed T1 Only	Completed T1, T2	Full Sample
	n = 93	*n* = 156	*N* = 249
Age	22.01	23.08	22.68
	(6.06)	(7.07)	(6.72)
Sex			
Male	28	40	68
Female	65	116	181
Occupation			
Not student	6	9	15
Student	87	147	234
Baseline consumption (z scores)[a]	0.60	0.59	0.60
	(0.09)	(0.08)	(0.08)

Note. Unless specified, means with *s*tandard deviations in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

Randomisation Checks

To determine the success of randomisation to conditions, age, sex and the baseline measure of fruit and vegetable consumption were analysed in two-way, between-participants ANOVAs, with the independent variables of self-affirmation and reason order.[20] No differences were found between any of the conditions in age, largest $F(1, 245) = 1.35$, $p = .247$, $\eta p^2 = .005$ (for the self-affirmation condition), sex, largest $F(1, 245) = 2.87$, $p = .092$, $\eta p^2 = .012$ (for reason order condition), or on the baseline measure of fruit and vegetable consumption, all F's$(1, 245) < 1$, suggesting that randomisation to conditions was successful (Table 53).

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[20] A violation of the expected cell count assumption prevented a Chi-square analysis from being run on sex.

Table 53.
Baseline Sample Characteristics

Variable	Non-Affirmed		Self-Affirmed		Full Sample
	Reasons For 1st	Reasons Against 1st	Reasons For 1st	Reasons Against 1st	
	$n = 72$	$n = 62$	$n = 64$	$n = 51$	$N = 249$
Age	23.75	22.48	22.14	22.10	22.68
	(8.11)	(6.38)	(6.08)	(5.66)	(6.72)
Sex[a]	0.75	0.63	0.80	0.73	0.73
	(0.44)	(0.49)	(0.41)	(0.45)	(0.45)
Baseline consumption (z scores)[b]	0.59	0.60	0.59	0.59	0.60
	(0.08)	(0.08)	(0.10)	(0.08)	(0.08)

Note. Means with standard deviations in parentheses. [a]Scored: male = 0, female = 1. [b]Scores were log-transformed to reduce the impact of outliers.

Self-Affirmation Manipulation Checks and Potential Mediators

The value importance manipulation check had significant homogeneity of variance ($p < .001$), and was analysed using the Mann-Whitney U-Test. There was a significant main effect of self-affirmation on the value importance manipulation check, $U = 670.00$, $Z_U = -12.49$, $p < .001$. Self-affirmed participants indicated that the value they had just written about was more important to them compared to non-affirmed participants. In a one-way, between-participants ANOVA, the thought-centred manipulation check, $F(1,247) = 1.58$, $p = .210$, $\eta p^2 = .006$, did not differ between non-affirmed and self-affirmed groups (Table 54). Taken together, these findings provide some evidence that participants were more self-affirmed in the experimental than the control group. In the funnel debriefing procedure no participants showed awareness of a link between self-affirmation manipulation and their responses to the dependent measures.

Table 54.

Means and Standard Deviations for Scores on the Measures of Self-Affirmation
Manipulation Checks

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Self-affirmation manipulation checks			
	n = 134	*n* = 115	*N* = 249
Value importance	2.88	6.30	4.46
	(1.44)	(1.00)	(2.12)
Thought-centred	3.99	4.19	4.08
	(1.20)	(1.29)	(1.24)

Note. Standard deviations are in parentheses.

The two potential mediators, positive other-related and positive affect, were significantly positively correlated, $r(249) = .60$, $p < .001$, indicating that it was appropriate to analyse these variables in a MANOVA. Using a one-way MANOVA (Wilk's Lambda), with the independent variable of self-affirmation (non-affirmed, self-affirmed) and two continuous dependent variables of positive other-related and positive affect, there was no significant multivariate main effect of self-affirmation on the potential mediators, $F(2, 246) = 1.61$, $p = .202$, $\eta p^2 = .013$. Participants across the groups had moderate scores on these variables (Table 55).

Table 55.

Means and Standard Deviations for Scores on the Measures of Potential Mediators

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Potential mediators			
	n = 134	*n* = 115	*N* = 249
Positive other-related affect	4.14	4.38	4.25
	(1.15)	(1.15)	(1.15)
Positive affect	4.03	4.26	4.13
	(1.12)	(1.20)	(1.16)

Note. Standard deviations are in parentheses.

Behaviour

Given the primary focus of the study on the effects of self-affirmation and the evidence that the randomisation to condition was successful, the remaining analyses were carried out on differences between non-affirmed and self-affirmed groups only, with the reason order conditions collapsed within these groups.

Differences on the combined measure of fruit and vegetable consumption at Time 2 were evaluated in a one-way, between-participants ANCOVA, with the independent variable of self-affirmation (self-affirmed, non-affirmed) and the baseline combined measure of fruit and vegetable consumption entered as a covariate. The baseline measure of fruit and vegetable consumption was significantly associated with its Time 2 counterpart ($p < .001$), indicating that it was appropriate to introduce the covariate into the analysis. There was no main effect of self-affirmation on the measure of fruit and vegetable consumption at Time 2, $F(1, 153) < 1$, with participants reporting similar fruit and vegetable consumption across the groups (Table 56).

Table 56.
Means and Standard Deviations for Scores on the Measure of Fruit and Vegetable Consumption at Time 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
	$n = 81$	$n = 75$	$N = 156$
Combined consumption (z scores)[a]	0.60	0.59	0.59
	(0.07)	(0.08)	(0.08)

Note. Standard deviations are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers.

Reasons

Data on the number and strength of reasons for and against eating at least 5 fruit and vegetables every day in the next 7 days collected at Time 1 were analysed in one-way, between-participants ANOVAs, with the independent variable of self-affirmation (self-affirmed, non-affirmed). There was no main effect of self-affirmation on the number of either reasons for, $F(1, 247) = 1.40$, $p = .238$, $\eta p^2 = .006$, or reasons against,

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$F(1, 247) < 1$, eating at least 5 fruit and vegetables every day in the next 7 days endorsed by participants. Similarly, there was no main effect of self-affirmation on the strength of either reasons for, $F(1, 247) = 3.31$, $p = .070$, $\eta p^2 = .013$, or reasons against, $F(1, 247) < 1$, eating at least 5 fruit and vegetables every day in the next 7 days. Participants across the groups thought the reasons for to be from quite strong to moderately strong and the reasons against to be from not strong to slightly strong (Table 57).

Table 57.
Means and Standard Deviations for Scores on the Measures of Reasons at Time 1

Variable	Non-Affirmed	Self-Affirmed	Full Sample
	$n = 134$	$n = 115$	$N = 249$
Number of reasons for	5.00	5.20	5.09
	(1.29)	(1.37)	(1.33)
Number of reasons against	1.57	1.51	1.55
	(1.26)	(1.19)	(1.22)
Strength of reasons for	2.75	2.99	2.86
	(1.03)	(0.99)	(1.02)
Strength of reasons against	0.82	0.82	0.82
	(0.74)	(0.81)	(0.77)

Note. Standard deviations are in parentheses.

Among the 5 most important reasons that influenced self-affirmed and non-affirmed participants' decision whether or not to eat at least 5 fruit and vegetables every day in the next 7 days were only the reasons for. These reasons were ranked identically, varying only in the rank position of two reasons. The reason "because I like the taste of fruit and vegetables" was more important to self-affirmed participants than the reason "because it would make my diet more balanced", with the rank position reversed for non-affirmed participants (Table 58).

Table 58.

Count and Percentage Scores on the Measure of Reason Importance at Time 1

Reasons	Non-Affirmed	Self-Affirmed	Full Sample
	$n = 134$	$n = 115$	$N = 249$
Because it would be good for my health	122 (91.0%)	104 (90.4%)	226 (90.8%)
Because it would provide me with vitamins, minerals and other nutrients	94 (70.1%)	86 (74.8%)	180 (72.3%)
Because I like the taste of fruit and vegetables	86 (64.2%)	78 (67.8%)	164 (65.9%)
Because it would make my diet more balanced	91 (67.9%)	68 (59.1%)	159 (63.9%)
Because it would help me prevent some illnesses	72 (53.7%)	63 (54.8%)	135 (54.2%)

Note. Percentages calculated in relation to participant numbers within groups.

Predictors of Behaviour

To test for immediate effects of self-affirmation, data on intentions, expectancies, and the predictors of intentions from BRT based on the two-component TPB collected at Time 1 ($N = 249$) were analysed in one-way, between-participants ANOVAs, with the independent variable of self-affirmation (self-affirmed, non-affirmed). To test for any changes that might occur within the dependent variables in a long run, data on these variables collected at Time 2 ($N = 156$) were analysed in one-way, between-participants ANCOVAs, with the independent variable of self-affirmation (self-affirmed, non-affirmed) and the corresponding Time 1 measures entered as a covariate. The covariates were significantly associated with their Time 2 counterparts (all ps < .001), indicating that it was appropriate to introduce them into the Time 2 analyses.

Intentions and expectancies. There was no main effect of self-affirmation on either Time 1 intentions, $F(1, 247) < 1$, or expectancies, $F(1, 247) < 1$, nor on Time 2 expectancies, $F(1, 150) < 1$. Participants across the groups had moderate to moderately

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high scores on intentions at Time 1.[21] There was, however, a main effect of self-affirmation on Time 2 intentions, $F(1, 153) = 5.72$, $p = .018$, $\eta p^2 = .036$, with non-affirmed participants reporting stronger intentions to consume 5 fruit and vegetables every day in the next 7 days than self-affirmed participants (Table 59).

Table 59.
Means and Standard Deviations for Scores on Intentions and Expectancies Measures at Time 1 and 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Intentions			
	$n = 134$	$n = 115$	$N = 249$
Time 1	4.53	4.58	4.56
	(1.50)	(1.63)	(1.56)
	$n = 81$	$n = 75$	$N = 156$
Time 2	4.90	4.52	4.72
	(1.51)	(1.55)	(1.54)
Expectancies[a]			
	$n = 134$	$n = 115$	$N = 249$
Time 1	0.60	0.58	0.59
	(0.08)	(0.08)	(0.08)
	$n = 81$	$n = 72$[b]	$N = 153$
Time 2	0.59	0.58	0.59
	(0.13)	(0.12)	(0.13)

Note. Standard deviations are in parentheses. [a]Scores were log-transformed to reduce the impact of outliers. [b]The drop in *n* is due to missing data.

To test whether self-affirmation affected the extent to which expectancies were more or less realistic, scores on the typical daily fruit and vegetable consumption at Time 2 were subtracted from scores on the expectancies about typical daily fruit and vegetable consumption at Time 1, meaning that optimistic expectancies corresponded to positive scores. Using one-sample t-tests, the means for non-affirmed, $t = 0.77$, $df = 80$, $p = .443$, and self-affirmed, $t = 0.90$, $df = 74$, $p = .372$, participants did not differ

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[21] The log-transformation of scores on expectancies prevented commenting on their magnitude. However, raw scores on expectancies suggested that both non-affirmed (Time 1: $M = 5.90$, $SD = 5.01$; Time 2: $M = 5.41$, $SD = 1.97$) and self-affirmed (Time 1: $M = 5.47$, $SD = 4.53$; Time 2: $M = 5.15$, $SD = 2.13$) participants expected to eat at least 5 portions of fruit and vegetables every day in the next 7 days at both time points.

significantly from zero, suggesting that both groups were realistic about their future

fruit and vegetable consumption (Table 60).

Table 60.
Means and Standard Deviations for Difference Scores Representing Optimism of Expectancies at Time 1

Variable	Non-Affirmed	Self-Affirmed	Full Sample
	$n = 81$	$n = 75$	$N = 156$
Difference scores[a]	-0.01	-0.01	-0.01
	(0.09)	(0.06)	(0.08)

Note. Standard deviations are in parentheses. [a]Scores of the minuend and subtrahend were log-transformed to reduce the impact of outliers.

Predictors of Intentions

Affective and cognitive attitudes. There was no main effect of self-affirmation

on either Time 1 affective, $F(1, 247) = 1.64$, $p = .202$, $\eta p^2 = .007$, or cognitive, $F(1,$

$247) = 1.72$, $p = .191$, $\eta p^2 = .007$, attitudes, nor on Time 2 affective, $F(1, 153) = 1.92$, p

$= .168$, $\eta p^2 = .012$, or cognitive, $F(1, 153) = 2.81$, $p = .096$, $\eta p^2 = .018$, attitudes. At

both time points, participants across the groups had moderately high to high positive

scores on affective attitudes and high positive scores on cognitive attitudes (Table 61).

Table 61.
Means and Standard Deviations for Scores on Affective and Cognitive Attitude Measures at Time 1 and 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Affective attitudes			
	$n = 134$	$n = 115$	$N = 249$
Time 1	5.36	5.52	5.43
	(1.09)	(0.96)	(1.03)
	$n = 81$	$n = 75$	$N = 156$
Time 2	5.61	5.48	5.55
	(0.99)	(1.16)	(1.07)
Cognitive attitudes			
	$n = 134$	$n = 115$	$N = 249$
Time 1	6.14	6.27	6.20
	(0.85)	(0.73)	(0.80)
	$n = 81$	$n = 75$	$N = 156$
Time 2	6.06	6.05	6.05
	(0.93)	(1.09)	(1.00)

Note. Standard deviations are in parentheses.

Injunctive, descriptive and moral norm. There was no main effect of self-affirmation on either Time 1 injunctive, $F(1, 247) < 1$, descriptive, $F(1, 247) = 1.93$, $p = .166$, $\eta p^2 = .008$, or moral, $F(1, 247) = 1.98$, $p = .161$, $\eta p^2 = .008$, norm nor on Time 2 injunctive, $F(1, 153) < 1$, descriptive, $F(1, 153) < 1$, or moral, $F(1, 153) < 1$, norm. At both time points, participants across the groups had moderately high scores on injunctive norm, moderately low scores on descriptive norm, and moderately low to neutral scores on moral norm (Table 62).

Table 62.
Means and Standard Deviations for Scores on Injunctive, Descriptive and Moral Norm Measures at Time 1 and 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Injunctive norm			
	$n = 134$	$n = 115$	$N = 249$
Time 1	4.81	4.66	4.74
	(1.44)	(1.45)	(1.44)
	$n = 81$	$n = 75$	$N = 156$
Time 2	4.77	4.77	4.77
	(1.51	(1.23)	(1.38)
Descriptive norm			
	$n = 134$	$n = 115$	$N = 249$
Time 1	3.32	3.54	3.42
	(1.20)	(1.34)	(1.27)
	$n = 81$	$n = 75$	$N = 156$
Time 2	3.77	3.96	3.86
	(1.25)	(1.31)	(1.28)
Moral norm			
	$n = 134$	$n = 115$	$N = 249$
Time 1	3.66	3.92	3.78
	(1.41)	(1.50)	(1.46)
	$n = 81$	$n = 75$	$N = 156$
Time 2	3.83	3.89	3.86
	(1.66)	(1.56)	(1.61)

Note. Standard deviations are in parentheses.

Perceived control and self-efficacy. There was no main effect of self-affirmation on either Time 1 perceived control, $F(1, 247) < 1$, or self-efficacy, $F(1, 247) < 1$, nor on Time 2 perceived control, $F(1, 153) = 1.18$, $p = .280$, $\eta p^2 = .008$, or self-

efficacy, $F(1, 153) < 1$. At both time points, participants across the groups had

moderately high to high scores on perceived control and self-efficacy (Table 63).

Table 63.
Means and Standard Deviations for Scores on Perceived Control and Self-Efficacy Measures at Time 1 and 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Perceived control			
	$n = 134$	$n = 115$	$N = 249$
Time 1	5.78	5.69	5.74
	(1.34)	(1.39)	(1.36)
	$n = 81$	$n = 75$	$N = 156$
Time 2	5.27	4.84	5.06
	(1.39)	(1.59)	(1.50)
Self-efficacy			
	$n = 134$	$n = 115$	$N = 249$
Time 1	5.37	5.48	5.42
	(1.57)	(1.58)	(1.57)
	$n = 81$	$n = 75$	$N = 156$
Time 2	5.39	5.14	5.27
	(1.48)	(1.40)	(1.44)

Note. Standard deviations are in parentheses.

Self-Regulatory Processes

Data on action control were available only at Time 2 ($N = 156$) and were

analysed in a one-way, between-participants ANOVA, with the independent variable of

self-affirmation (non-affirmed, self-affirmed). There was no main effect of self-

affirmation on action control at Time 2, $F(1, 154) < 1$, with participants across the

groups having moderately low to neutral scores, (Table 64).

Table 64.
Means and Standard Deviations for Scores on Action Control at Time 2

Variable	Non-Affirmed	Self-Affirmed	Full Sample
Action control			
	$n = 81$	$n = 75$	$N = 156$
Time 2	3.65	3.45	3.55
	(1.56)	(1.51)	(1.53)

Note. Standard deviations are in parentheses.

Discussion

The study aimed, firstly, to probe the effect of self-affirmation on reasons given for and against behaviour from BRT (Westaby, 2005) and to establish whether they mediate the relationship between self-affirmation and behaviour. Secondly, to replicate some of the effects from the previous studies in the thesis by investigating the impact of self-affirmation on the constructs from the two-component TPB (Conner & Sparks, 2005), expectancies, moral norm, action control and behaviour. Using the context of fruit and vegetable consumption, it was hypothesised that all the dependent variables would be promoted by self-affirmation. This prediction, however, did not realise and null effects were observed on all but one of the dependent variables. In particular, at the 7-day follow-up, intentions related to eating at least 5 fruit and vegetables every day were greater in non-affirmed relative to self-affirmed participants.

Although no statistically significant differences between self-affirmed and non-affirmed participants were observed on the variables related to reasons for and against eating at least 5 fruit and vegetables every day, the difference on the strength of reasons for variable approached significance ($p = .070$). This, taken together with the finding that the self-affirmed and non-affirmed groups nominated almost identical reasons that had the greatest influence on their decision whether or not to eat at least 5 fruit and vegetables every day, with all of the reasons being for engaging in the target behaviour, suggests the possibility that the significant effects of self-affirmation on reasons for might have been observed in a different, less familiar health context (e.g., mercury consumption in sea food, Griffin & Harris, 2011). Indeed, the 5 A DAY slogan has by now become such common knowledge that it is difficult to derogate and some coping psychological methods, such as spontaneous self-affirmation (Harris et al., 2011), might have been employed by non-affirmed participants to satisfy the motive to protect self-

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integrity in the face of the threatening health message, thus making the effects of the experimental self-affirmation manipulation difficult to observe.

Similarly to Study 1 of the thesis and practically all published self-affirmation literature at the beginning of the research programme, but in contrast to Study 2 and 3 of the thesis, there were no behavioural effects of self-affirmation. Therefore, it appears that the effects of self-affirmation on behaviour might be more likely to be observed at longer follow-ups that would allow people time to better prepare for engaging in the target behaviour (e.g., buying fruit and vegetables). A lack of self-affirmation effects on reasons and behaviour prevented the mediation analysis from being run. Further, no positive effects of self-affirmation on intentions were found. Indeed, at the 7-day follow-up, self-affirmed participants intended to engage in eating at least 5 fruit and vegetables every day less than non-affirmed participants. While these findings are at odds with the findings of the majority of published self-affirmation studies, they are in line with the findings of Reed and Aspinwall (1998), the authors of the first study that employed self-affirmation for engendering health behaviour change. In particular, in both studies, intentions were lower in self-affirmed participants: immediately post self-affirmation manipulation in Reed and Aspinwall's (1998) study and at the 7-day follow-up in the current study. The lowered intentions, however, did not lead to hampered health-related behaviour at follow-ups in either study. While this is only a speculation, it is not inconceivable that similar effects might be observed more often than is suggested by the published self-affirmation literature due to the "file drawer problem", that is filing away studies with null effects or those that go against theoretical expectations (e.g., Rosenthal, 1979).

There were also no effects of self-affirmation on the predictors of intentions from the two-component TPB. These findings, taken together with the rest of the

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findings in the thesis, suggest that the TPB might not reliably capture the processes underlying health behaviour change post self-affirmation. Indeed, in the two studies that found both the effect of self-affirmation on fruit and vegetable consumption and a mediator of the relationship between self-affirmation and behaviour, the mediators were constructs other than those postulated by the TPB: response-efficacy in Epton and Harris's (2008) study and expectancies in Study 3 of the current thesis. In any case, the reported effects of self-affirmation on the TPB constructs do not appear to be robust and might be driven in each particular study by specific features of that study. The variables outside the TPB tested in the current study, such as expectancies, moral norm and action control, however, were also unaffected by self-affirmation. A lack of effects on expectancies, despite their mediating role in the relationship between self-affirmation and behaviour in Study 3 of the thesis, suggests that these effects of self-affirmation might similarly not be robust.

While in the current study the hypothesised effects were not observed, these results are unlikely to have arisen from a failure of the self-affirmation manipulation. This is, firstly, because, in the face of no effects on the thought-centred self-affirmation manipulation check (Napper et al., 2009), an identical self-affirmation manipulation led to a behaviour change in Studies 2 and 3 of the thesis. Secondly, because self-affirmed participants indicated that the value they wrote about was more important to them compared to non-affirmed participants. The latter manipulation check does not presume that certain mind-set changes take place in the wake of self-affirmation and relies solely on the indication that participants in the self-affirmed/non-affirmed groups actually chose their most/least important value to write about. The former manipulation check, however, is built around the idea that self-affirmation necessarily focuses people's thoughts on their positive qualities and values, but given that the mechanisms

underlying the effects of self-affirmation are yet to be established (Harris & Epton, 2009), this manipulation check remains only a potential rather than a definitive check. Indeed, some evidence is available that self-affirmation works by influencing people's "feelings of caring for other people or things, rather than self-worth or self-images" (Crocker et al., 2008, p. 745). Similar criticisms can be levied at the potential mediators, such as positive other-related and positive affect, since their status as mediators of the effects of self-affirmation is based on only a handful of studies (e.g., Crocker et al., 2008; Sherman et al., 2000, Study 1).

The study is, however, not without limitations. Once again it relied on a convenience sample (i.e., "whoever is readily available", Schwarz, 2007, p. 57) that comprised mostly young women studying for a university degree, a sample characteristic in common with the majority of self-affirmation studies on health (Harris & Epton, 2009). Having said that, no differences across the groups were found on any of the demographic variables assessed and, more importantly, on the measure of baseline fruit and vegetable consumption. The study also relied on self-report, one of the drawbacks of which is that it "may simply be treated lightly" by participants (Jordan & Zanna, 2007, p. 168), but self-affirmation studies using biomarkers are rare (e.g., Logel & Cohen, 2012), which is due to the constraints imposed by the availability of financial resources, time required to test each individual participant and so on. Therefore, in line with the majority of self-affirmation studies, self-report was deemed appropriate for the purposes of the current study. It was, however, tempered by the inclusion of the three measures of fruit and vegetable consumption successfully applied in Study 2 and 3. Finally, the 7-day follow-up used in the current study might not have been long enough to detect changes in behaviour. However, given that the beneficial effect of self-affirmation on longer-term behaviour was shown in the previous studies in

the thesis (Study 2 and 3), the emphasis in the current study was mostly on novel mechanisms that might underlie the effects of self-affirmation, specifically, reasons for and against behaviour.

In conclusion, Study 4 did not find the effects of self-affirmation on reasons for or against eating at least 5 fruit and vegetables every day. Apart from the negative effect on intentions, there were also no effects of self-affirmation on the other variables from BRT based on the two-component TPB, as well as on the actual target behaviour. In addition, the constructs outside BRT, such as expectancies, moral norm and action control were also unaffected by self-affirmation. Notwithstanding these findings, the current study was a reasoned venture into a novel theory-based explanation of the effects of self-affirmation, which is high up on the agenda of research aimed at the development of health interventions (Michie & Abraham, 2004). As no robust effects of self-affirmation were found on the TPB or their derivatives, such as the two-component TPB and BRT, it gave more confidence to the idea that self-affirmation researchers should not concentrate too narrowly on the classic TPB framework when accessing the effects of self-affirmation.

CHAPTER SIX

This chapter provides an overview of the background to the thesis and discusses its findings on the effects of self-affirmation on health-related behaviour, intentions, predictors of intentions and the mechanisms underlying these effects. The fit of the thesis findings with the findings of concurrent self-affirmation studies sharing a similar research agenda is considered and their potential impact on the state of self-affirmation research is assessed. The chapter culminates in a reference back to the research questions, with the aim of answering them with the benefit of the knowledge gained from running the studies in the thesis, as well as from concurrent self-affirmation studies. Acknowledging the limitations of the studies in the thesis, the chapter suggests newly-opened research avenues for self-affirmation research into health promotion. Final conclusions are drawn by reflecting on whether the empirical findings of the thesis are likely to stand the test of time and by considering the potential of health interventions involving self-affirmation to be applied in real-life settings.

General Discussion

An Overview of the Background to the Thesis

The thesis was undertaken within the context of fruit and vegetable consumption, a health-related behaviour chosen for its ability to significantly reduce the chances of developing cardiovascular disease (e.g., Crowe et al., 2011), which is a major lifestyle-related killer disease in the UK (Office for National Statistics, 2012). Lower than advised fruit and vegetable consumption among the British public (e.g., DEFRA, 2012) can be put down to a number of known psychological factors (Croyle et al., 1997). Addressing these with theory-based interventions is considered key to health promotion through psychological channels (Michie & Abraham, 2004). One example of a psychological theory that can be used for this purpose is Self-Affirmation Theory

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(Steele, 1988), which postulates that people are concerned with their sense of self-integrity, a threat to which (e.g., uncongenial health-related information) activates the self-system, which deflects that threat by bringing into awareness a personal characteristic or value that is unrelated to but as equally important as the threat. At the beginning of the research programme of the thesis, there was considerable evidence that self-affirmation promotes open-mindedness to threatening health information and intentions to act on such information (Harris & Epton, 2009). Even more, one study had demonstrated increased fruit and vegetable consumption in self-affirmed participants over a period of 7 days (Epton & Harris, 2008). At the time, however, this finding was more of an exception than a rule and reasons for why such findings do not occur routinely were investigated in the thesis by examining some motivational and volitional aspects of the process of health behaviour change following self-affirmation.

The research questions posed in the thesis addressed the issues of whether self-affirmation has an effect on implicit motivation to change health-related behaviour; whether intentions to change health-related behaviour formed following self-affirmation have characteristics of genuine intentions; whether a combination of self-affirmation and a volitional intervention is effective in helping people to translate their intentions to change health-related behaviour into actual health-related behaviour; and whether self-affirmation has an effect on health-related cognitions not accounted for by the classic TPB. For the purposes of answering these research questions, it was aimed to investigate the effects of a health intervention involving self-affirmation on fruit and vegetable consumption, intentions to engage in this health-related behaviour and the predictors of intentions, as well as on some additional to the TPB-proposed precursors of health behaviour change, such as implicit motivation, operative stability, certainty and meta-stability of intentions, reasons for and against behaviour, expectancies, moral

norm and self-regulatory processes. Further, it was aimed to investigate the possibility that intentions formed following self-affirmation fall victim to the intention-behaviour gap and to attempt to bridge this gap with implementation intentions. To achieve these aims, four experimental studies designed to promote fruit and vegetable consumption were run. In each, participants reported their baseline fruit and vegetable consumption before being randomly allocated to the self-affirmation or no affirmation condition and reading a health message about eating at least 5 portions of fruit and vegetables every day and completing measures of dependent variables immediately after the manipulation and after designated follow-up periods. Among the novelties of the studies were the inclusion of the Single Category Implicit Association Test in Study 1, a novel self-affirming task inspired by implementation intentions in Study 2, an implementation intention manipulation in Study 3 and a pilot study to develop reasons for and against fruit and vegetable consumption in Study 4.

Findings Arising from the General Aim of the Studies in the Thesis

The effects of self-affirmation on behaviour. One of the key findings of the thesis is the demonstration that self-affirmation is able to engender health behaviour change not only in the short-term but also in the longer-term. In particular, self-affirmation promoted fruit and vegetable consumption at the 7-day follow-up in Study 3 and at the 1- and 3-month follow-ups in Study 2 and 3, respectively. These behavioural effects provided corroborating evidence for the effects of the original study that observed actual health behaviour change 7 days after a psychological intervention involving self-affirmation (Epton & Harris, 2008) and extended these observations to the point at which practically significant health gains might be expected. Moreover, not only did Study 3 replicate Epton and Harris's (2008) findings, it achieved this using an online experimental environment, participants of both genders and a variety of measures

of fruit and vegetable consumption, which, being different from the features of the original study, renders the behavioural findings of the thesis a conceptual replication. In addition, the behavioural effects of self-affirmation in Study 2 and 3 proved to be strong enough to be evident at the different levels of statistical scrutiny, such as explanatory, longitudinal and, in Study 3, intention-to-treat analyses, which heightens their credibility.

Despite these findings, the effects of self-affirmation on behaviour were not found in Study 1 and 4. This, however, can be put down to the studies' short follow-up periods (7 days), which in the absence of a need to initiate behaviour change immediately, such as completing daily fruit and vegetable consumption diaries as in Epton and Harris's (2008) study, might not have been long-enough for behaviour change to be observed. Further, it is worth mentioning that the significant effects of self-affirmation on fruit and vegetable consumption in Study 2 were found between participants who self-affirmed with the standard and novel self-affirmation method. The novel method was subsequently deemed inadequate for self-affirmation, as it did not produce effects comparable to those engendered by the standard self-affirmation method. Evidence, however, has subsequently emerged that not only are different standard methods of self-affirming, such as writing an essay about important personal values, an essay about acts of kindness or completing a questionnaire about acts of kindness, equally effective in boosting positive interpersonal feelings postulated to mediate the effects of self-affirmation (Armitage & Rowe, 2011; Crocker et al., 2008), unorthodox methods of self-affirming might produce similar behavioural effects to the usual ones. In particular, Pavey and Sparks (2012, Study 3) found a marginally significant difference ($p = .07$) in alcohol consumption at a 2-week follow-up between at-risk participants who implicitly self-affirmed by unscrambling sentences containing

words associated with autonomy (e.g., freedom) and comparable controls. Even more, Armitage, Harris and Arden (2011) found statistically significant differences in alcohol consumption at a 1-month follow-up between non-affirmed participants and both participants who completed a questionnaire revolving around personal acts of kindness, the standard self-affirmation manipulation, and those who formed an if-then plan of the type "If I feel threatened or anxious, then I will think about the things I value about myself", a novel self-affirmation manipulation. Therefore, there is an emerging trend towards broadening the scope of self-affirmation methods at the disposal of researchers, which promises to enhance the applicability of health interventions involving self-affirmation to a wider audience.

The beneficial effect of the standard self-affirmation manipulation on health-related behaviour demonstrated by Armitage et al. (2011) is in line with similar effects demonstrated in Study 2 and 3 of the thesis and represents only one example of statistically significant behavioural effects of self-affirmation that emerged concurrently with the findings of the thesis in the wake of the heightened interest in the behavioural effects of self-affirmation spurred on by Epton and Harris's (2008) success. Among other examples are the findings of the beneficial effects of self-affirmation on the uptake of health-related behaviours, such as cooked vegetable consumption (but not overall fruit and vegetable consumption in participants who moderately valued health, Pietersma & Dijkstra, 2011), exercise (Jessop, Sparks, Buckland, Harris, & Churchill, 2013, Study 1); the reduction of unhealthy behaviours, such as overeating (Logel & Cohen, 2012), alcohol consumption (in participants at higher risk, Scott, Brown, Phair, Westland, & Schüz, 2013), tanning behaviour (in participants at higher risk, Schüz, Schüz, & Eid, 2013) and avoidance of medical-screening feedback (Howell & Shepperd, 2012); and health-related psychological functioning, such as body

satisfaction (in adolescent female participants, Armitage, 2012; in female participants at higher risk, Bucchianeri & Corning, 2012). Having said that, Jessop et al. (2013, Study 2) failed to replicate the beneficial effect of self-affirmation on the uptake of exercise and Klein et al. (2010) did not find such effects on colorectal cancer screening (admittedly, the latter study was underpowered to find a change in behaviour).

Some studies employing multifaceted health interventions and including self-affirmation as a component part were also successful at promoting health-related behaviours. In particular, a combination of positive affect and self-affirmation interventions received on top of patient education helped coronary patients improve physical activity (Peterson et al., 2012) and hypertensive African Americans improve medication adherence (Ogedegbe et al., 2012) to a greater extent relative to the recipients of patient education alone. Using a conceptually similar health intervention, Mancuso et al. (2012), however, did not find that asthma patients increased their physical activity over and above that fostered by patient education. Notwithstanding, Peterson et al. (2013) found that, when considered together, the results of the studies that employed a combination of patient education, positive affect induction and self-affirmation manipulation to the promotion of health-related behaviours suggest that it produces significantly better outcomes than patient education in isolation. Overall, there is an emerging trend in published self-affirmation literature to report health behaviour change following health interventions incorporating self-affirmation, including among clinical populations and over prolonged follow-up periods (e.g., among coronary patients over 12 months with bimonthly booster interventions in Peterson et al.'s, 2012, study). The findings of half the studies in the current thesis fit well with this trend, with the duration of the health behaviour change demonstrated in

Study 3 (3 months without boosters) being one of the longest reported in the self-affirmation literature to date.

The effects of self-affirmation on intentions. The studies in the thesis did not find significant beneficial effects of self-affirmation on intentions. Indeed, in Study 4, non-affirmed participants had greater intentions to improve their daily fruit and vegetable intake relative to self-affirmed participants at the 7-day follow-up. These findings are unlike those reported in the majority of published self-affirmation studies either available at the outset of the research programme or that have subsequently emerged. In more recent studies, a beneficial effect of self-affirmation on intentions was reported in the context of the uptake of health-related behaviours, such as healthy food consumption (Cornil & Chandon, 2013, Study 3), cooked vegetable consumption (but not overall fruit and vegetable consumption in participants who moderately valued health, Pietersma & Dijkstra, 2011), colorectal cancer screening (in unrealistically optimistic participants, Klein et al., 2010); the reduction of unhealthy behaviours, such as alcohol consumption (particularly in participants at higher risk, Scott et al., 2013; in participants at high risk, Pavey & Sparks, 2012, Study 2), coffee consumption (only in the presence of a strong but not weak health message, Klein, Harris, Ferrer, & Zajac, 2011, Study 2) and smoking (in a loss-framed health message group, Zhao & Nan, 2010); and health-related psychological functioning, such as body satisfaction (in female participants at higher risk, Bucchianeri & Corning, 2012). Having said that, no statistically significant effects of self-affirmation on intentions were found in the context of physical exercise (Jessop et al., 2013), seeking psychotherapy (Lannin, Guyll, Vogel, & Madon, 2013), skin photoageing and cancer (Good & Abraham, 2011) and tanning behaviour (Schüz et al., 2013). Also, mixed findings have emerged on the effect of self-affirmation on motivation in the context of smoking (no effect, Schneider,

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Gadinger, & Fischer, 2012) and alcohol consumption (beneficial effect in participants at high risk, Pavey & Sparks, 2012, Study 1 and 2).

Despite the mostly supportive evidence for the effect of self-affirmation on intentions in the majority of concurrent self-affirmation studies, the null effects of self-affirmation on intentions reported in the current thesis accord well with Epton and Harris's (2008) and Jessop et al.'s (2013, Study 1) findings, who, similarly, did not find significant effects of self-affirmation on intentions in the face of increased fruit and vegetable consumption and physical exercise, respectively. Further, the negative effects of self-affirmation on intentions in Study 4 fit with the findings reported by Reed and Aspinwall (1998) in relation to coffee consumption and, more recently, by Radtke and Scholz (2013) in relation to alcohol consumption. Therefore, the effects of self-affirmation on intentions might not be as straightforward as previously thought and imply that the classic TPB does not fully account for the processes of behaviour change engendered by self-affirmation. Recent findings by Lannin et al. (2013) support this suggestion: self-affirmation had an effect only on willingness, operationalised as "one's openness to perform a behaviour given the opportunity" (p. 511), but not intentions to undergo psychotherapy, with the former being associated with spontaneous and the latter deliberative decision-making processes.

The effects of self-affirmation on the predictors of intentions. The proposition that self-affirmation might affect health-related behaviour by routes other than those postulated by the TPB is further supported by a lack of evidence for the effects of self-affirmation on the predictors of intentions from either the classic or the two-component TPB researched in the thesis. Similarly, only a little evidence has emerged from the concurrent self-affirmation studies on the effect of self-affirmation on the TPB predictors of intentions, and what has emerged is either mixed or limited to a

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single investigation. Specifically, explicit attitudes were found to be promoted by self-affirmation in the context of alcohol consumption (in participants at high risk, Pavey & Sparks, 2012, Study 2), unaffected in the context of condom use (Laws & Rivera, 2012, Study 2 and 3) and both promoted (Jessop et al., 2013, Study 1) and unaffected (Jessop et al., 2013, Study 2) in the context of exercise. Perceived behavioural control was found to be unaffected at the significance level $p = .05$ in the context of exercise (Jessop et al., 2013). Although more supporting evidence was found for the beneficial effect of self-affirmation on the predictors of intentions from PMT, the evidence cannot be said to be consistent. Specifically, in the wake of self-affirmation, the feelings of perceived vulnerability to succumbing to breast disease or cancer were shown to increase (only in the presence of a strong but not weak health message, Klein et al., 2011; Puntoni, Sweldens, & Tavassoli, 2011, Study 3a), but remained unaffected in relation to succumbing to the dangers of smoking (Schneider et al., 2012). Risk perception, a cognition from HAPA akin to but more "cognitively-tinged" than perceived vulnerability (Klein et al., 2011, p. 1241), was found to be boosted in self-affirmed participants in the context of mercury consumption in sea food (in moderately frequent consumers high in defensiveness, with those low in defensiveness experiencing a reduction in perceived risk, Griffin & Harris, 2011), but was unaffected in the context of alcohol and caffeine consumption (Klein et al., 2011), skin cancer and ageing (Good & Abraham, 2011) or tanning behaviour (Schüz et al., 2013). Perceived susceptibility, a cognition from EPPM similar to both perceived vulnerability and risk perceptions, evidenced an upward trend post self-affirmation ($p = .08$) in the context of skin photoageing but was reduced in the context of skin cancer (Good & Abraham, 2011). The feelings of fear in the context of smoking (Schneider et al., 2012) and of perceived severity in the context of smoking (Schneider et al., 2012), skin photoageing and cancer

(Good & Abraham, 2011) were unaffected by self-affirming, but perceptions of threat were increased after an exposure to a pictorial health message showing body parts affected by alcohol consumption (Armitage et al., 2011) and decreased in the face of a task asking participants to rate personal body shape (only in adolescent girls, but not boys, Armitage, 2012). Mixed evidence was also found for the effect of self-affirmation on self-efficacy in the context of smoking (no effect, Schneider et al., 2012; beneficial effect, Zhao & Nan, 2010). Similarly, the effect of self-affirmation on response efficacy received mixed support: it was both promoted and unaffected in the context of exercise (Jessop et al., 2013, Study 1 and 2, respectively) and unaffected in the context of smoking (Schneider et al., 2012). Overall, the picture on the effects of self-affirmation on the predictors of intentions has undergone some change, with perceived vulnerability gaining potential as a cognitive construct promoted by self-affirmation, but self-efficacy remaining one of the strongest supported constructs to date.

Findings Arising from the Central Specific Aims of the Studies in the Thesis

The effects of self-affirmation on implicit motivation, properties of intentions and reasons for behaviour. In addition to the effects of self-affirmation on the usual TPB measures of intentions and their predictors, in the current thesis the nature of motivation in self-affirmed participants was explored at the implicit level, as well as, in greater depth, at the explicit level by investigating the operative stability, certainty and meta-stability of intentions and reasons for behaviour postulated to predict intentions by BRT. Implicit motivation was not promoted by self-affirming and no attempts at its promotion have been reported in the concurrent self-affirmation studies. Having said that, implicit attitudes, a construct related to implicit motivation, were found to benefit from self-affirmation. Specifically, strong negative implicit attitudes to condom use, which resulted from giving fictitious negative feedback on an intelligence

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test (operationalised as self-threat) to participants with a large discrepancy between their implicit and explicit self-esteem, were overturned when the participants were given fictitious positive feedback on an intelligence test (operationalised as self-affirmation; Laws & Rivera, 2012, Study 2). No evidence was obtained to suggest that self-affirmation leads to the formation of intentions that are not genuine on the basis of the effects of self-affirmation on the operative stability, certainty and meta-stability of intentions. Following Harris and Epton's (2009) statement that, apart from Reed and Aspinwall's (1998) study, "studies have typically found that self-affirming does promote healthier intentions among those at risk" (p. 9), in concurrent self-affirmation research no attention was directed at the investigation of the properties of explicit intentions postulated by Cooke and Sheeran (2013), other than the usual direction and strength of intentions. The investigation of the effects of self-affirmation on reasons for and against given for behaviour did not produce statistically significant results and remained unique to the current thesis. In sum, in terms of the evidence presented in the current thesis, self-affirmation appears not to have an effect on implicit motivation, operative stability, certainty and meta-stability of intentions and reasons for behaviour, but, by virtue of being based on single research attempts to gain insights into these effects, this conclusion should be treated with caution.

The effects of a combination of self-affirmation and implementation intentions on the process of health behaviour change. In Study 3, it was found that a health intervention involving self-affirmation is more effective in promoting short-term health-related behaviour when coupled with implementation intentions. Specifically, self-affirmed participants who formed implementation intentions were more likely to consume at least 5 portions of fruit and vegetables every day at the 7-day follow-up compared to self-affirmed participants who did not form implementation intentions. No

synergistic effects of the two interventions were found on intentions. Notwithstanding this, given that questions have been raised over whether self-affirmation exhibits its effects through intentions, the behavioural effects observed in Study 3 are important in their own right. Of note, implementation intentions did not complement the effects of self-affirmation at the 3-month follow-up. This, however, was likely to be the result of the content of the implementation intention manipulation, which was aimed primarily at helping participants to initiate the target behaviour. In published self-affirmation literature, no studies that observed a beneficial effect of a combination of self-affirmation and implementation intentions have emerged yet, but Ferrer et al. (2012) demonstrated that, if experiencing positive affect after reading a health message, self-affirmed participants were better prepared to form spontaneous (i.e., not prompted by the standard experimental instructions) implementation intentions to reduce alcohol consumption relative to non-affirmed participants. Having said that, Jessop et al. (2013) observed a detrimental effect from adding implementation intentions to self-affirmation: in two studies, participants in the self-affirmation plus implementation intention condition exercised less than participants in the self-affirmation condition alone. Jessop et al. (2013) suggested that this pattern of findings was the result of the incompatibility of self-affirmation with implementation intentions stemming from either self-affirmation undermining the formation of implementation intentions due to the higher and lower level of construal associated with the former and the latter, respectively, or from implementation intentions interrupting the central route to persuasion associated with self-affirmation. However, taken together with the success of Study 3 in the current thesis that employed a similar strategy to the promotion of health-related behaviour, a more compatible conclusion with the overall pattern of results on the effects of a combination of self-affirmation and implementation intentions would be that

it is subject to some boundary conditions. Whether this is the case might be usefully researched using a variety of behavioural contexts, measures and follow-ups. Epton et al.'s (2013) experimental protocol in which they aim to apply a health intervention incorporating self-affirmation and implementation intention manipulations on top of health messages to improve a range of health-related behaviours, such as alcohol and fruit and vegetable consumption, physical activity and smoking, with outcome measures taken at 1- and 6- month follow-ups, including several physical biomarkers, promises to shed some light on this issue. Overall, a combination of self-affirmation and implementation intentions holds promise to gain the attention of self-affirmation researchers. Given its success in the current thesis, as well as the separate success of the two manipulations and a combination of motivational and volitional interventions in broader research literature, it is likely to prove to be effective in promoting health-related behaviours, at least within particular boundary conditions.

Findings Arising from the Peripheral Specific Aims of the Studies in the Thesis

The effects of self-affirmation on moral norm, expectancies and self-regulatory processes. Once behavioural effects are found, it is informative to uncover mechanisms underlying these effects in order to increase the likelihood of their future replication. Several potential motivational and volitional mechanisms were investigated in the thesis, namely moral norm, expectancies and self-regulatory processes. Mixed findings were observed on moral norm, with moral norm being negatively affected by self-affirmation in Study 2 but remaining unaffected in Study 4. As no other evidence for the role of moral norm on the process of health behaviour change following self-affirmation has emerged in the concurrent self-affirmation studies, on the basis of the thesis findings it appears that moral norm is not an active ingredient in the process of health behaviour change spurred on by self-affirmation. In Study 3 of the thesis,

expectancies measured at the 7-day follow-up were positively affected by self-affirmation, with the effect also being evident in a longitudinal analysis. Interestingly, expectancies formed by participants in all groups were realistic, but it was self-affirmed participants who formed more ambitious expectancies and subsequently fulfilled them. Neither of the two self-regulatory processes assessed in the thesis, namely action control and perceived self-regulatory, were positively affected by self-affirmation. This is despite Harris's (2011) proposition that one of the key factors in behaviour change following self-affirmation is successful self-regulation, which makes behaviours aimed at reducing health threat, known as danger control (e.g., incorporating more fruit and vegetables in a diet), more likely to be performed post self-affirmation than those aimed at reducing fear from the threat, known as fear control (e.g., derogating a health message on the benefits of eating fruit and vegetables).

Of the postulated potential mediators, only expectancies (measured at the 7-day follow-up) mediated the relationship between self-affirmation and behaviour (measured at the 3-month follow-up). Notwithstanding this, in the concurrent self-affirmation studies, a number of mediators affecting the different stages of the process of health behaviour change were identified. Vulnerability mediated the effects of self-affirmation on intentions in the context of coffee consumption (in the presence of a strong but not weak health message, Klein et al., 2011); motivation mediated the effects of self-affirmation on attitudes and intentions in the context of alcohol consumption (Pavey & Sparks, 2012, Study 2); intentions mediated the effects of self-affirmation on behaviour in the context of cooked vegetable consumption (but not overall fruit and vegetable consumption in participants who moderately valued health, Pietersma & Dijkstra, 2011) and alcohol consumption (in participants at higher risk, Scott et al., 2013); self-esteem and shifts away from factors related to the target behaviour as the sources of self-esteem

mediated the effects of self-affirmation on behaviour in the context of body satisfaction (Armitage, 2012). Overall, it appears that the focus of self-affirmation research has now widened to encompass all the questions required to be answered to assess the success of a health intervention, including the final in the hierarchy of questions "How does the intervention work?" (Michie & Abraham, 2004). This state of affairs is in itself a sign of progress in health-related self-affirmation research, even in the absence of robust findings.

Answers to the Research Questions

When providing answers to the research questions posed in the current thesis, it is important to remember that direct and, subsequently, conceptual replication of experimental findings is necessary in order to establish the degree of their generality and boundary conditions (Roediger III & McCabe, 2007). As some findings in the thesis are the result of single investigations, the findings should be interpreted with caution. Bearing this in mind while taking stock from the research findings of the thesis, at present, the answer to the research questions of whether self-affirmation has an effect on implicit motivation to change health-related behaviour is negative; whether intentions to change health-related behaviour formed following self-affirmation have characteristics of genuine intentions is affirmative; whether a combination of self-affirmation and a volitional intervention is effective in helping people to translate their intentions to change health-related behaviour into actual health-related behaviour is affirmative; whether self-affirmation has an effect on health-related cognitions not accounted for by the classic TPB is negative in relation to the additional constructs postulated by the two-component TPB and BRT.

To elaborate on the only research question an investigation into which produced statistically significant results, namely the effects of a combination of self-affirmation

and a volitional intervention (more specifically, implementation intentions), it is worth entertaining several conjectures about the mechanisms underlying these results. The mechanisms behind the effects of implementation intentions are arguably reasonably well understood, with the most important of them being the creation of an automatic link between a key situation and a response to it (Gollwitzer, 1999). However, the mechanisms behind the effects of self-affirmation are less clear. Nonetheless, there is evidence that self-affirmation might exhibit its effects on health-related behaviour through the promotion of higher levels of construal, which is associated with a tendency to analyse the success of personal goal striving and the interplay between competing personal goals (Wakslak & Trope, 2009). This might be the result of the postulated ability of self-affirmation to break the vicious circle of one failure leading to another as a result of the undermined confidence in personal psychological resources (Logel & Cohen, 2012). This ability might be rooted in enhanced psychological functioning post self-affirmation, such as better self-control (Logel & Cohen, 2012; Schmeichel & Vohs, 2009), working memory (Logel & Cohen, 2012), stress coping (Creswell et al., 2005; Logel & Cohen, 2012) and problem-solving under stress (Creswell, Dutcher, Klein, Harris, & Levine, 2013).

Limitations of the Studies in the Thesis

While the studies in the thesis aimed to address several of the general limitations of self-affirmation studies, they still remained limited in some respects. The criticism levied at the corpus of health-related self-affirmation studies on the participant level, such as over-reliance on young women in higher education (Harris & Epton, 2009), remained an issue and the findings of the thesis should be interpreted bearing their limited generalisability in mind. Having said that, randomisation checks did not reveal significant differences between the experimental and control groups on either

demographic characteristics or the baseline measure of fruit and vegetable consumption. Despite the fact that during the recruitment stage potential participants were asked not to take part in the studies if they had taken part in similar studies previously, an overlap between participants recruited into the different studies in the thesis might have occurred, with some participants being aware of a link between self-affirmation and their responses on the dependent measures as a result of previous debriefing procedures.

Although the studies in the thesis applied a simpler method of self-affirming, in which, rather than writing an essay, participants completed a structured task, the health message remained complex. It might have been more effective if some parts of it were pictorial, such as an image of a body highlighting the body parts negatively affected if the advice in the health message is not followed, as used by Armitage et al. (2011). Materials of this type, however, are not normally utilised by the NHS for the promotion of fruit and vegetable consumption and the objective of the studies in the thesis was to emulate such materials. Further, the health message might not have been threatening enough to engender full-blown defensive processing in non-affirmed participants, which might have prevented the effects of self-affirmation from being fully revealed. This is, firstly, due to the fact that health information about fruit and vegetable consumption might by now be overly familiar and, secondly, due to the fact that the beneficial effects of fruit and vegetable consumption have been recently publicly questioned, with the British media widely reporting that the benefits of eating fruit and vegetables were previously much exaggerated, following the finding of Boffetta et al.'s (2010) study on the limited impact of fruit and vegetable consumption on cancer risk. The studies in the thesis can also be criticised for the reliance on self-report to measure the dependent variables. However, as no resources were available to use more objective measures, such as biomarkers, this weakness was addressed by incorporating some degree of

redundancy into the studies, with at least two measures of fruit and vegetable consumption being used in each study.

Newly-Opened Research Avenues

Among the new research avenues arising from the findings of the thesis, the effects of self-affirmation on health-related behaviour and expectancies are particularly worthy of further investigation. As regards behaviour, it is necessary to replicate the findings of the long-term change in fruit and vegetable consumption behaviour and to attempt to extend it to more than 6 months. According to the Transtheoretical Model of Behaviour Change (Prochaska, DiClemente, & Norcross, 1992), it is after this period of time that the target behaviour is consistently performed, with attention being focused on the prevention of relapses to old habits rather than their modification. The achievement of such prolonged health behaviour change after self-affirming might be made more likely if the standard experimental framework of a typical self-affirmation study is extended with additional interventions. One such intervention might be a booster self-affirmation introduced in the middle of the follow-up period, a strategy that proved to be successful at promoting academic performance of self-affirmed African-American students over the period of an autumn semester (Cohen, Garcia, Apfel, & Maser, 2006, Study 2). Moreover, booster implementation intentions have been shown to be successful in promoting fruit and vegetable consumption (Chapman & Armitage, 2010), which suggest the possibility to observe similar effects with health interventions based on self-affirmation. Further, given that synergistic effects were found between self-affirmation and implementation intentions aimed at the initiation of behaviour, combining self-affirmation with implementation intentions aimed not only at the initiation but also at the maintenance of health behaviour would be the next logical step.

As regards expectancies, since they mediated the effect of self-affirmation on behaviour in Study 3 of the thesis, it would be informative to investigate their precursors with the view of addressing them in a health message. Further, the finding that, in the same study, expectancies did not mediate the effect of self-affirmation on behaviour immediately post self-affirmation manipulation but did so 7 days after is worthy of further research. One explanation for this finding is that expectancies undergo some transformation during the process of health behaviour change that is brought about by the experience of successes and failures at trying to incorporate new behaviour into one's lifestyle. Learning what is involved in the performance of the target health behaviour allows more feasible assessment of one's ability to engage in this behaviour, which makes the subsequent measure of expectancies a better predictor of behaviour than previously. Even if this is the case, there are still questions remaining as to what processes helped self-affirmation to exhibit its effects on behaviour at the 7-day follow-up. As the measures from the TPB were found to be unaffected, some factors outside this model of behaviour should be investigated. An example of such factors could be response efficacy from PMT that was found to partially mediate the relationship between self-affirmation and behaviour in Epton and Harris's (2008) study. Admittedly, beliefs about the consequences of behaviour from the TPB capture similar processes to response efficacy from PMT.

The research avenues outlined above should be pursued not only in the context of fruit and vegetable consumption, but also in the context of the uptake of other health-promoting and the reduction of health-compromising behaviours. If the aim is to give an opportunity to self-affirmation to demonstrate its full potential, a self-affirmation manipulation should be placed before the health message, a point at which defensive responding is yet to be activated, because "self-affirmations and defensiveness are

interchangeable ways of alleviating threat" (Critcher, Dunning, & Armor, 2010, p. 956). The awareness of participants of the effects of self-affirmation on information processing should be controlled for by either concealing these effects (Sherman et al., 2009) or providing an opportunity to participants to decide whether or not to self-affirm (Silverman, Logel, & Cohen, 2013). Unfamiliar threatening health information should preferably be used, with ideal experimental settings being created by the provision of fictitious information (e.g., the TAA enzyme paradigm in Howell & Shepperd's, 2012, study). Having said that, much criticism has been levied at deceiving research participants due to ethical concerns. For example, once deceived, participants might feel that they are not constrained by honesty in other psychological investigations, thus jeopardising the future of psychological science (Baumrind, 1985). Therefore, any novel medical advances regarding links between common lifestyle behaviours and health should be capitalised on, as was the case in the Harris and Napper's (2005) study on the link between excessive alcohol consumption and breast cancer. Given the findings that self-affirmation might heighten a tendency to disengage from a goal if initial efforts at trying to achieve it are met with failure (Vohs, Park, & Schmeichel, 2013), advice on how to incorporate new health-related behaviour should be sensitive to this issue in order to minimise the chances of self-affirmation being counterproductive. The cause of helping self-affirmation to demonstrate its full potential might be further helped by the use of culturally sensitive health messages that take into account the type of orientation (approach vs. avoidance) and self-construal (independent vs. interdependent) of research participants (Sherman, Uskul, & Updegraff, 2011). When measuring the effects of self-affirmation, the burgeoning trend to use biomarkers, such as BMI, should be continued (e.g., Logel & Cohen, 2012). Further, techniques normally associated with research in cognitive psychology, such as *N*-back task

assessing working memory used by Logel and Cohen (2012), should be exploited more often, as they have recently provided some novel clues to how self-affirmation might cause the effects reported in research literature.

Concluding Remarks

The thesis has provided evidence that self-affirmation in the presence of a health message is able to promote longer-term health behaviour change and identified expectancies as a mechanism behind this effect. Given that behaviour change post self-affirmation has also been recently reported in the concurrent self-affirmation studies, the behavioural findings of the thesis are likely to stand the test of time. At this stage, however, this cannot be claimed in relation to expectancies, as, to date, this is a one-off finding that requires further replication. Taken together with findings from studies that were successful at promoting only health-related behaviour but not intentions, a lack of effects on intentions in the thesis suggests that this effect of self-affirmation might not be as robust as was previously thought, even though there is no indication that intentions, when promoted by self-affirmation, might not be genuine. This means that a search for self-affirmation mechanisms outside the classic models of behaviour and health behaviour remains on the agenda of self-affirmation researchers. Notwithstanding the remaining questions, the demonstration of the longer-term behaviour change in the current thesis and the concurrent studies is an indication that the potential of self-affirmation to be incorporated into real-life health interventions is strengthening.

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