THE QUESTION-BEHAVIOUR EFFECT: CAUSES AND MODERATORS

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ABSTRACT

The question-behaviour effect, how asking attitude, intention and prediction questions influences behaviour, has been widely examined since its discovery by Sherman (1980). This PhD thesis on the question-behaviour effect consists of three parts: 1) A meta-analysis of the research thus far, 2) A series of studies investigating possible underlying mechanisms of the question-behaviour effect, and 3) A series of studies investigating the moderating roles of self-affirmation and goal difficulty in question-behaviour effect interventions.

The meta-analysis in the first part of this thesis is carried out to examine the effectiveness of the question-behaviour effect as influence technique. Studies were included if they used an experimental design with random allocation of participants, where the experimental condition consisted of asking attitude, intention and/or prediction questions, and the dependent variable was a behavioural measurement. This resulted in 55 comparisons in 35 papers, with a total of 49108 participants. Applying a random-effects model on the data resulted in a small effect (d = 0.26, 95%CI [0.18, 0.34]). Methodological causes and moderators related to the applicability and universality of the technique are discussed.

The second part of this thesis consists of three experimental studies that investigated whether dissonance processes can explain question-behaviour effects. The studies investigated how predicting future behaviour can influence participants' recalled past behaviour regarding both positive and negative behaviours. Study 1 investigated how asking participants about positive (daily exercise) or negative (not brushing your teeth before going to bed) behaviours affected recalled past behaviour. Study 2 focused on how recalling past behaviour using a time-frequency (number of times) or likert-type scale (never – all the time) influences the effect of prediction questions on recalling a negative behaviour (procrastination). Study 3 investigated how combining a future behaviour prediction with a

positive or negative prime could influence recalled past behaviour regarding buying bottled water.

The results of Study 1 showed that asking participants about a negative behaviour (going to bed without brushing your teeth) reduced recalled past behaviour. Study 2 showed that offering time-frequency rather than likert-type scale answering possibilities is required to find an effect and the results of Study 3 showed that a positive or negative prime can influence recalled past behaviour in that direction, while adding a future behaviour prediction question attenuates the effect. Theoretical explanations of the findings and ideas for further research are discussed and a fourth, correlational, study is described that suggests social proof might explain some of the question-behaviour effect findings.

In the third part of this thesis, the moderating role of self-affirmation and goal difficulty in question-behaviour effect interventions was investigated. In studies 5-7, participants were asked a prediction question related to eating five-a-day (hard-goal) or eating fruit and vegetables in general (easy-goal). Some participants received a self-affirmation task as part of their questionnaire and all participants received a voucher they could use to collect a free bowl of fruit or vegetables after completing the questionnaire.

Results showed that easy-goal prediction questions (eating fruit and vegetables) resulted in an increase in voucher use while hard-goal prediction questions (eating five-a-day) resulted in a decrease in voucher use. Adding self-affirmation to the intervention attenuated these question-behaviour effects. Implications of findings and general themes of the thesis are discussed in the general discussion chapter.

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CHAPTER 1

INTRODUCTION

What did you do this weekend? Are you going to the cinema tomorrow? Will you attend our meeting next week? People often ask each other these kinds of questions in social contexts. This happens for all kinds of reasons such as arranging to meet, starting a conversation or to pass the time. Asking these sorts of questions about past and future behaviour seems harmless, but what if merely asking questions about behaviour influences people? Or, more specifically, what if asking people questions about their behaviour influences their future behaviour? The concept of how asking questions can influence future behaviour has been studied under various labels such as the *self-erasing nature of errors of prediction* (S. J. Sherman, 1980), *the mere-measurement effect* (Morwitz, Johnson, & Schmittlein, 1993) and the *self-prophecy effect* (Spangenberg & Obermiller, 1996).

In 2006 researchers from different streams of research on the topic published a paper in *Social Influence*, in which they explained how these concepts could be integrated in one label: The Question-Behaviour Effect (Sprott, Spangenberg, Block, et al., 2006). They suggested *"*the use of the label *question-behavior effect* to describe any phenomenon whereby questioning of a person (whether it be through an intention measure, self-prediction, a measure of satisfaction, or other means) influences the future performance of the focal behavior*"* (Sprott, Spangenberg, Block, et al., 2006, p. 129).

The question-behaviour effect is the topic of this thesis. The thesis consists of a review of the published research so far, empirical research on the underlying mechanisms of the question-behaviour effect and factors that moderate its effectiveness.

1.1 Overview of the Thesis

In the literature review all the papers written on the question-behaviour effect between 1980 and present are discussed. This includes focal behaviours, underlying mechanisms and research methods as well as other relevant aspects of the question-behaviour effect such as moderating factors and the applicability of the effect when designing a behavioural change intervention. In addition, theories linked to the question-behaviour effect and gaps in the literature are discussed.

The literature review is followed by a meta-analysis of the question-behaviour effect. This meta-analysis synthesises the findings in the question-behaviour effect literature in a systematic way and addresses questions about the effectiveness of question-behaviour effect interventions, underlying mechanisms and moderating study characteristics such as type of question, intervention setting, time interval, measurement of behaviour and type of focal behaviour.

Following the meta-analysis, a series of experimental studies investigating the underlying mechanism of the question-behaviour effect are reported. This part starts with a behavioural questionnaire to decide which focal behaviours to use in the experimental studies and is followed by three experimental studies investigating the causes of the question-behaviour effect (studies 1-3). These studies focus on recalled past behaviour related to some of the focal behaviours identified in the behavioural questionnaire. The findings of these three studies, together with a literature update, result in Study 4, a correlational study investigating social proof in relation to the question-behaviour effect.

The second series of studies investigate the effects of goal difficulty and adding a self-affirmation task to a question-behaviour effect intervention on future behaviour (studies 5-7). In these studies, participants made predictions about their fruit and vegetable

consumption and an objective behavioural measurement was used to investigate the effects of adding self-affirmation to these questions.

The implications of the findings presented in this thesis, as well as their limitations and directions for further research are considered in the general discussion chapter that follows after the empirical part of the thesis and concludes the thesis.

1.2 Contribution

This thesis contributes to the existing knowledge of the question-behaviour effect in three ways. First, the thesis provides an updated effect-size of question-behaviour effect research in the meta-analysis, as well providing evidence that commercial and personal relevant behaviours are affected to a greater extent by question-behaviour effect interventions compared to compliance or societal relevant behaviours.

Second, while the meta-analysis shows a robust effect, the empirical studies show that the effect is fragile and that small changes in the wording of the question, type of behaviour and goal difficulty can influence the direction and size of the effect.

Third, the thesis provides evidence that social processes such as social proof and dissonance processes rather than attitude activation drive the question-behaviour effect and that adding a self-affirmation task to a question-behaviour effect intervention attenuates the question-behaviour effect.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this review, the scientific literature on the question-behaviour effect is summarised. The key aspects of this phenomenon are covered: different types of focal behaviours, the underlying mechanisms, factors moderating the effectiveness of the question-behaviour effect as social influence technique, methods used in question-behaviour effect research, applicability, and limitations and gaps in the literature. Based on this literature review, three research questions are posited, which are the basis for the rest of this thesis. While the label "question-behaviour effect" first occurred in the literature in 2006 (Sprott, Spangenberg, Block, et al., 2006), the literature on this topic that was published before that date will be referred to as question-behaviour effect research, regardless of the original label used by the researchers, which was often either the *mere measurement effect* or the *self-prophecy effect*.

2.2 The Question-Behaviour Effect

The question-behaviour effect is defined as: "[A label] to describe any phenomenon whereby questioning of a person (whether it be through an intention measure, self-prediction, a measure of satisfaction, or other means) influences the future performance of the focal behavior." (Sprott, Spangenberg, Block, et al., 2006, p. 129) and that definition is used in this thesis.

Sherman (1980) was the first to describe how asking questions might change behaviour. In his studies, he found that people have a tendency to mispredict their future behaviour. When asked to predict their future behaviour, they either overestimated or underestimated their behaviour compared to actual behaviour of participants in a control

condition who were not asked questions about their behaviour. Sherman measured the behaviour of the participants who had answered the behaviour questions and found that even though participants under-predicted or over-predicted their future behaviour compared to the actual behaviour of peers, they compensated for this error by performing the behaviour in the way they predicted. This first study showed that merely predicting future behaviour could increase or decrease the likelihood of the occurrence of that behaviour. Sherman found this effect in three studies (S. J. Sherman, 1980). People who made a prediction whether or not they would write a counter attitudinal essay were less likely to write the counter attitudinal essay on request. Predicting to sing the US national anthem showed the same result. However, when people were asked to collect money for the cancer society for three hours, people who were asked to predict their behaviour complied with the request more often compared to the participants in the control group.

A typical question-behaviour effect intervention would assign participants randomly to two groups, a control group and a question-behaviour effect group. This last group is asked a question about their behaviour, for example "do you predict you will go to the gym next week?", while the control group does not answer such question. The question-behaviour effect group is likely to overpredict their future behaviour, with a higher percentage of participants stating that they would attend the gym compared to the actual attendance rate of the participants in the control group. Then, after a time interval (e.g. an hour or a week) participants are asked to report their gym attendance or the gym is contacted for attendance data (e.g. Spangenberg, 1997). Typically, health club attendance would be higher in the group that was asked to predict their health club attendance, compared to the control group that was not asked that question. In the following section, different behaviours are discussed that have been investigated in question-behaviour effect research.

2.3 Behaviours

While the question-behaviour effect has been investigated in relation to a wide variety of focal behaviours, some behaviours have been investigated by multiple teams in different studies. In this section, these are clustered and discussed by behaviour.

2.3.1 Voting Behaviour

One of the first studies on the question-behaviour effect in an applied setting was conducted to investigate the effects of predicting future behaviour in relation to voting (Greenwald, Carnot, & Beach, 1987). During a phone call, people were asked to predict whether or not they expected to register for voting (Study 1) or whether they expected to vote (Study 2). The results showed that participants were more likely to register to vote (Study 1) and vote (Study 2) after being asked to predict their future voting behaviour compared to a control group that was not asked to predict their future behaviour.

Greenwald later tried to replicate the effect in two other elections (Greenwald, Klinger, Vande Kamp, & Kerr, 1988). In their first study no significant effect was found, which the authors attributed to a possible ceiling effect. Their second study did find the effect previously found; that predicting future behaviour increased voter turnout. In this study, they also took into consideration prior voting behaviour and found that only the group of participants with a moderate prior voting turnout showed a significant increase in voting in the elections after predicting their future behaviour.

Given the implications of these findings and the inconsistent results reported in these two papers, a replication study was conducted to investigate whether the question-behaviour effect holds up for voting in elections (Smith, Gerber, & Orlich, 2003). In this study, the procedure by Greenwald and colleagues was replicated, and no significant increase in number of voters in the experimental group compared to the control group was found. The authors

conclude that Greenwald and colleagues' findings were probably the result of small samples or a type-1 error.

Voting behaviour has been investigated more recently by Goldstein and colleagues (D. Goldstein, Imai, Göritz, & Gollwitzer, 2008). Goldstein et al. set out to compare the effects of measuring intentions and using implementation intentions on the topic of voting. In addition, the authors compared two types of focal behaviours: "one-shot goals" (voting on the Election Day) and "open ended goals" (voting early) as well as manipulating whether the goal is in the near or farther future. Their results showed that implementation intentions influenced both near or farther in the future behaviours as well as both types of behaviour, voting on the day and voting early. The intention questions showed the same results, apart from the distant one-shot goal, indicating that, compared to implementation intentions, question-behaviour effects are more likely to decay over time. Overall there seems to be some evidence that asking people questions about their voting intentions can influence voting behaviour.

2.3.2 Health Behaviours

Ayres et al. (2013) tested the effectiveness of the question-behaviour effect on health behaviour. They investigated whether people were more likely to sign up for a personalised health plan to reduce the risk of coronary heart disease after a question-behaviour effect intervention. Their research showed that merely designing a question-behaviour effect intervention did not significantly increase the percentage of people obtaining the health plan, nor did a motivational intervention that provided risk information. However, a combined intervention in which the risk information was followed by the question-behaviour effect intervention did show a significant increase in the percentage of people signing up for the personalised health plan.

Health behaviours were further investigated by Conner, Godin, Norman and Sheeran (2011) who tested the effect of a question-behaviour effect intervention for two disease prevention behaviours, a health check for the general public (Study 1) and an influenza vaccination for health care professionals (Study 2). Analysis showed significant increases in disease prevention behaviours in both studies for the participants that received the questionnaire compared to their respective control group. Closer inspection found that completing and not merely receiving the questionnaire accounted for these effects.

Using cervical screening attendance as focal behaviour, Sandberg and Conner (2009) investigated whether adding anticipated regret (Simonson, 1992) to a question-behaviour effect intervention would moderate the outcome. They found that the attendance rate significantly increased in both experimental groups (behavioural questions only and behavioural questions plus anticipated regret) compared to a control group. The prediction plus anticipated regret condition increased the attendance rates significantly compared to the prediction only condition for people who returned the questionnaire as requested.

2.3.3 Alcohol Consumption

Another behaviour that has been investigated in relation to the question-behaviour effect is alcohol consumption. In a first study, McCambridge and Day (2008) asked a sample of university students to complete a questionnaire. As part of the questionnaire, the participants in the experimental group were asked to fill in the AUDIT scale (Alcohol Use Disorders Identification Test, Saunders, Aasland, Babor, de la Fuente, & Grant, 1993), a 10-item measurement to identify alcohol use disorders. Participants in the control condition were not asked to fill in this scale. The questions focused on past experiences regarding alcohol use instead of making a future behaviour prediction. The results of this study showed that after filling in the AUDIT scale as an intervention, participants' AUDIT scores at a 2-3

month follow up were reduced. Some of the secondary outcome measurements, such as self-reported number of drinks in the past seven days, were also lower compared to the participants in the control group (15.9 versus 18.7), while others, number of days drinking in the past month for example, slightly increased. In their results section, the authors do warn that the outcomes might be due to a Hawthorne effect (Miller & Landsberger, 1959) as the participants self-reported their drinking behaviour and knew they were monitored during the follow-up period.

Todd and Mullan (2011) investigated binge drinking in female undergraduate students. They asked participants to either fill in either a Theory of Planned Behaviour questionnaire, containing questions about the different factors in the Theory of Planned Behaviour such as attitudes, social norms and intentions, or an unrelated questionnaire. In addition, all participants completed a behaviour component at the end of the session. The statistical analysis showed that, when controlling for past behaviour, the participants in the experimental condition showed lower amounts of alcohol consumption at the follow up measurement after two to three weeks compared to the control group. So while the first study found an effect of measuring past behaviour (AUDIT scores), on future behaviour, this study adds to that by measuring elements of the Theory of Planned Behaviour compared to a behavioural outcome. Together, these two studies show that asking people questions related to the Theory of Planned Behaviour and past behaviour can reduce self-reported drinking behaviour. This suggests that question-behaviour effect interventions do not necessarily increase behaviour, but can influence the behaviour in a social desirable way.

2.3.4 Physical Activity

The same method of using a Theory of Planned Behaviour questionnaire has also been applied to physical activity (Godin, Bélanger-Gravel, Amireault, Vohl, & Pérusse, 2011).

They asked a sample of overweight/obese adults to fill in a Theory of Planned Behaviour questionnaire regarding their physical activity (experimental condition), or fruit and vegetable consumption (control condition). At the three-month follow up measurement, participants in the experimental condition reported significantly higher levels of physical activity ($d = 0.20$) compared to the control group. In addition to this small effect of asking questions on future behaviour, the authors point out the simplicity of the intervention, as distributing a questionnaire is not time consuming and very cost effective. Like the studies on alcohol consumption, this study relied on self-reported behaviour as outcome measurement so the question remains whether these effects hold up when an objective behaviour measurement is used.

Spence and colleagues used pedometers to investigate question-behaviour effects in relation to walking behaviour (Spence, Burgess, Rodgers, & Murray, 2009). They compared conditions with or without a behavioural questionnaire with conditions in which participants were provided with a pedometer to trace their steps. They found that providing the pedometer increased reported walking behaviour, but that the behavioural questionnaire did not influence the behaviour or attitudes towards walking.

Spangenberg (1997) set out to increase health club attendance rates by asking whether or not people were expecting to use their health club during the next week. All participants in this study were members of a health club that had not attended their health club recently. The health club attendance measurement after ten days did not show an effect, while the six month follow up measurement showed a marginally significant effect, meaning that members who were asked the prediction question visited their health club more often than the members who were not asked such question. In addition, after removing the members who had cancelled their membership, a significant increase was found in health club attendance in the six-month period after the intervention.

2.3.5 Donating Blood

The effects of asking questions on subsequent blood donation have been investigated in a series of papers. In a first study on blood donation, Godin, Sheeran, Conner and Germain (2008) investigated to what extent a question-behaviour effect intervention could motivate people to donate blood. Blood donors either received a question-behaviour effect questionnaire (experimental condition) or no questionnaire (control condition). Receiving this questionnaire resulted in an 8.6% and 6.4% increase in number of registrations at a blood drive after six and twelve months respectively. These statistically significant findings also have a practical significance as the intervention could easily be rolled out in a larger population, thereby substantially increasing the absolute amount of blood donated.

A second study by Godin and colleagues, however, found different results (Godin et al., 2010). In a study focusing on retaining novice blood donors, participants again received a questionnaire or no questionnaire. There was no significant difference between the experimental and control condition while additional conditions including implementation intentions did find an effect after six and twelve months. Interestingly, further analysis showed that people who had completed the questionnaire were more likely to donate blood compared to people who did not complete the questionnaire. This suggests that questionnaire completion might be a key factor in a successful question-behaviour effect intervention. Another explanation is the possibility of a selection bias. Since the groups did not differ when analysing all participants that received a questionnaire, but did show statistically significant differences when looking at questionnaire completion, the people who did not complete the questionnaire donated less blood than the control group. This is supported by another study on blood donation by Van Dongen, Abraham, Ruiter and Veldhuizen (2013), who set out to replicate findings that the amount of blood donors could be increased by using a question-behaviour effect. In two studies, they addressed new donors (Study 1) and active donors

(Study 2) and found that neither group was more inclined to donate blood after answering questions about their blood donation behaviour.

They also found no overall effect of sending questionnaires. However, there were significant differences between participants who completed versus not completed the questionnaire. After a comparison of these studies, they concluded that there was no evidence that distributing questionnaires could influence blood donation behaviour, unless participants completed the questionnaire. The question remains whether completion of the questionnaire influences people to donate blood, or that those people were more likely to donate blood to begin with. The need for a focus on non-compliance in clinical randomised controlled trials as reported in this paper was further discussed in a commentary on the paper by Ferguson (2013).

Expanding the research by investigating long term effects, Godin and colleagues focused on lapsed donors (Godin, Germain, Conner, Delage, & Sheeran, 2014). This study found that after six months, participants receiving a question-behaviour effect intervention did not significantly donate more blood. However, the 15-month follow up did show a significant increase in blood donation in this condition compared to the control group. An included implementation intention condition showed a significant effect after 6 and 15 months, where the effect size at 15 months was similar to the question-behaviour effect condition.

2.3.6 Purchasing Behaviour

The question-behaviour effect has not only been applied to social desirable or personal relevant behaviours, but also to consumer behaviours, such as purchasing products and services. Most companies run customer satisfaction studies to investigate how they can improve their service. If asking people about their attitudes, intentions or opinions can

influence behaviour, it is possible that these satisfaction surveys influence future behaviour in a similar way.

Fitzsimons and Morwitz (1996) investigated the effect of measuring intentions on brand-level purchase behaviour of cars. They used an existing survey panel that, among others, answered questions related to their intentions to buying a new car. This panel completed the questionnaire every three months and new panel members were compared with panel members who had filled in the questions several times before. In this quasi-experimental study, they found that people who already owned a car were more likely to buy another car by the same brand after answering intention questions regarding purchasing a car and brand preference, while people who bought their first car tended to buy a brand that had a large market share. This shows that asking questions about behavioural intentions does not only influence small, relatively insignificant decisions, but also large financial ones.

Further research in the automotive industry investigated the influence of filling in surveys on service purchases using the same type of satisfaction questionnaire (Dholakia, Morwitz, & Westbrook, 2004). Their high response rates (in the order of 90-95%, p.102) are helpful as earlier studies on the influence of satisfaction surveys suggested that the effect might be driven by response bias instead of a genuine effect of asking people questions (Morwitz et al., 1993). Dholakia et al. discovered that the number of service visits and number of services bought at those visits both increased when taking part in a satisfaction survey. The authors noted that even customers who expressed negative views in the satisfaction surveys showed an increase in number of service visits and number of services bought. They explained this as a consequence of the company's ostensibly honest interest and valuing of the customers' expressed opinions.

While response bias was not a limitation in this study, it might be cause for biased effects in other studies that use satisfaction surveys to influence purchasing behaviour.

Anderson, Hansen and Tripathi (2007) attempted to mathematically correct for these biases. They came up with a model taking into consideration "two major obstacles [we identified] to measuring the mere measurement effect in a non-experimental, field setting. These are: Who is asked to participate in a survey? Who agrees to respond to a survey?" (Anderson et al., 2007, p. 4). They found that without controlling for these questions in a study on purchasing behaviour from an online store, an increase of 15% was predicted, while taking these biases into consideration resulted in a decrease in purchasing behaviour of 17%. This study shows that, since the effect size is in the opposite direction compared to the original findings, taking into consideration selection bias is key in interpreting findings of satisfaction measurement studies. This issue can be addressed by focusing on a high response rate in field settings where randomised controlled experiments are not an option.

Not all research on the question-behaviour effect in relation to consumer behaviour has focused on purchasing products. Obermiller and Spangenberg (2000) investigated the effectiveness of the question-behaviour effect as a way of increasing university fundraising donations. University alumni were phoned and asked whether or not they wanted to donate money to the university. Analysis showed that more people were willing to donate money when asked to predict their donating behaviour first. There was no difference in the amount of money donated per participant.

2.3.7 Risky Driving Behaviour

Another behaviour investigated in relation to the question-behaviour effect is risky driving. Falk (2010) investigated how completing an attitude and self-reported risky driving behaviour questionnaire could influence future risky driving behaviour. The results showed that completing the questionnaire a second time four weeks after completing the first questionnaire resulted in lower self-reported risky driving behaviour. A second study

investigated three different subscales of the questionnaire in the first study separately. All three subscales; risky driving behaviour, attitudes to risk taking and attitudes to accidents, resulted in lower self-reported risky driving at the follow up measurement. This indicates that not only asking people about behaviour can influence subsequent behaviour, but that merely asking people about their attitudes can have the same effect.

Interestingly, Falk also looked into the location where the participants completed the questionnaire. Whether the participants filled in the pre-test and post-test questionnaire in two different locations (a military enrolment centre and at home) or the same location (at home) did not influence the results. This implies that a question-behaviour effect intervention does not require personal contact between the participant and researchers and that postal questionnaires are likely to have similar effects compared to questionnaires distributed on another location.

2.3.8 Dispute Over Question-Behaviour Effects on Vice Behaviour

Williams, Block and Fitzsimons (2006) investigated whether the question-behaviour effect can only be used to increase the occurrence of socially normative behaviour, or that socially non-normative health behaviour could also be increased by such an intervention. They showed that both exercising and illegal drug use were more likely to occur after answering questions about these behaviours. They suggested that researchers should be careful when asking people about negative behaviours, as asking these questions could result in the participants engaging in the negative behaviours more frequently.

The claim that asking about illegal drug use increases that behaviour was disputed by other researchers (Schneider, Tahk, & Krosnick, 2007). Schneider and his colleagues (2007) requested the data set and reanalysed the data to see whether the initial conclusions were right. They concluded that the suggestions in the Williams et al. paper were not justified by

the data. Since the data on illegal drug use was skewed and there were a high number of zero values, they stated that the statistical test used by Williams et al. was not justified. When they re-analysed the data taking into account outliers and testing for the assumptions of the statistical test, the effect of the intervention was non-existent. When the data on exercising behaviour was reanalysed, this also produced a non-significant effect.

The authors of the original paper on vice behaviours responded to the findings by Schneider and his colleagues in a commentary in *Social Influence*, the same journal where the original paper as well as the re-analysis by Schneider et al. were published (Fitzsimons, Block, & Williams, 2007). They agreed with the critique on using incorrect statistical tests. However, their stance was that some of the tests carried out by Schneider's team were actually showing significant results (2 out of the 13 analyses) or marginally significant (3 out of 13 analyses) and they stated that readers should decide for themselves whether or not to accept the conclusions from their original studies. In addition, they felt it was not justified to delete outliers, because there was no way to find out whether these outliers were drug users before, or if they were 'regular' participants who were affected by the intervention to an extreme extent. They finished their response by pointing out a series of replication studies (Fitzsimons, Nunes, & Williams, 2007) that should prove their point that asking people about vice behaviours is risky. The focal behaviours in those experiments were skipping classes, procrastinating and going for drinks. While these behaviours in the replication studies might not be socially desirable, they do not seem as negative compared to drug use, the vice behaviour in the original study.

Fitzsimons, Nunes and Williams (2007) investigated whether or not asking students about vice behaviours such as skipping classes, procrastinating and going for drinks inclined them to perform these behaviours more often compared to a control group that was not asked questions about these behaviours. They found that students who were asked to predict how

many classes they would skip during the next semester predicted the same number of classes compared to the actual behaviour of a control group. However, measurements of their behaviour showed that these students skipped more classes than their fellow students in the control group.

The next behaviour, procrastination, was measured by giving students the opportunity to attend screenings of new movies. To take part, they had to be able to attend at least four film screenings in one week. Participants who were interested in attending had to provide their email address after filling in the question-behaviour effect questionnaire. Analysis showed that more people provided their email address when they had first been asked to predict their future procrastination behaviour.

The last study they designed had two focal behaviours, either going out with friends for drinks or watching television; both were regarded as forms of procrastination by the authors. In both behaviours, results showed that being asked to predict future behaviour increased the occurrence of the behaviour. However, when a different intervention was used, in which implementation intentions or self-reward interventions were added to the self-prediction, they found a significant effect in the opposite direction. Students watched less TV and did not go out for drinks with friends as much in the intervention group compared to the control group.

As mentioned before, the behaviours might not be socially desirable, but it is unclear how ‘vice’ these behaviours really are and whether increased performance of these behaviours should always be a considered negative outcome. For all behaviours, skipping classes, watching movies or television, or going for drinks with friends, it is difficult to pinpoint what the students were doing the rest of the time and whether or not they compensated for their ‘vice’ behaviours by studying at other times for example. While these findings suggest that the occurrence of behaviours can be influenced in both directions by a

question-behaviour effect intervention, the question remains whether vice behaviours such as drug use are negatively influenced by asking questions about the behaviour.

The link between vice behaviours and the question-behaviour effect was further discussed in a research dialogue in the *Journal of Consumer Psychology* (Schwarz, 2008). The dialogue kicked off with a paper stating that asking questions about risky behaviours was risky itself and that screening adolescents for risky behaviours might be counterproductive (Fitzsimons & Moore, 2008). They discussed the paper by Williams et al. (2006) that found the increase in drug use as a result of the question-behaviour effect and suggested that when people are asked about a negative behaviour towards which they have at the least an implicit positive attitude, this could lead to an increase in performance of this negative behaviour. They warned that asking questions about behaviour can have these negative effects and suggested researchers should look into how they can ask questions that do not influence future behaviour in a negative way such as warning participants about possible question-behaviour effects.

In a response to this paper, Sherman (2008) suggested that the conclusions that negative behaviours occur more often after being asked questions about the behaviour were premature and not as robust as proposed by Fitzsimons and Moore (2008). Sherman discussed the issue of which process should account for this change in negative behaviour as implicit attitudes are difficult to change and, in addition, he suggested that the findings that negative behaviours can be increased by asking questions are sometimes based on focal behaviours that are "not of a very high risk variety" (S. J. Sherman, 2008, p. 98). One criticism related to the methods used in the negative behaviour studies is that the authors did not ask whether or not participants would use drugs, but how frequently they would use drugs, changing the type of question asked and the answers participants were likely to give.

In the concluding reply to this paper, Moore and Fitzsimons addressed these criticisms (Moore & Fitzsimons, 2008), stating that since the answers on the prediction questions do not correlate with the dependent variable, the self-reported drug use, this can be seen as an example of implicit attitudes changing instead of a visible change in the explicit attitudes of participants. While this might be the case, it seems unlikely that all these studies show correlations "close to zero and […] non-significant in all of the reported studies" (Moore & Fitzsimons, 2008, p. 112) and yet still show an effect of prediction on future behaviour. Given that these correlations are close to zero, the conclusion by Schneider and colleagues that the effects are due to errors in the data-analysis seems more feasible (Schneider et al., 2007).

Spangenberg and Obermiller (1996) investigated the effect of asking a prediction question on cheating behaviour. They asked students to predict whether or not they would cheat if they were highly unlikely to get caught (experimental group) or the students made no prediction at all (control group). Compared to the behaviour of the control group, the experimental group under-predicted their cheating behaviour. A couple of days after completing the questionnaire, all students received a closed-book take-home assignment to finish over the weekend. They were instructed not to use any books or ask for the help of classmates to complete the assignment. In the assignment, two questions were used as dependent variable. As lecturers and a former student regarded these two questions very difficult, it was highly unlikely that students could answer both questions correctly without consulting sources like books or classmates. Therefore, if a student answered both questions right, they would be regarded as to have cheated on the test. Results showed that students who had been asked to predict their cheating behaviour cheated less compared to the control group who were not asked to predict their cheating behaviour.

2.3.9 Meta-Analyses of the Question-Behaviour Effect

Besides the experimental research and literature reviews on the question-behaviour effect, some researchers have investigated the phenomenon by using meta-analysis. In 1999, two researchers with experience in conducting question-behaviour effect research performed a meta-analysis in which they included all papers that had been published on the topic up to that point in time (Spangenberg & Greenwald, 1999). This meta-analysis consisted of 11 comparisons in six papers. The list of included studies not only shows that relatively few papers were written on the topic by that time (six papers of which five were published in peer-reviewed journals), but also that the number of researchers investigating the effect was surprisingly low as only one paper (Sherman, 1980) was not co-authored by a researcher involved in conducting the meta-analysis. Converted to a standardised effect size, Cohen's *d*, the meta-analysis showed that asking people prediction questions about their future behaviour resulted in a small effect on future behaviour ($d = 0.26$). Studies introducing a new phenomenon usually overestimate the effect size as a result of publication bias and small samples. Since this first meta-analysis, several large scale studies have been conducted (e.g. Godin et al., 2008; van Dongen et al., 2013) which provide the need for an updated meta-analysis to rule out publication bias as the underlying mechanism of the question-behaviour effect.

In 2006, another meta-analysis was conducted (Sprott, Spangenberg, Knuff, & Devezer, 2006). This meta-analysis focused on self-prophecy studies related to health behaviours and consisted of seven studies. They found an effect size, converted to Cohen's *d*, of $d = 0.54$. Interestingly, all seven studies had one co-author in common, which might raise questions as to whether the phenomenon can be replicated in different labs, using different procedures and target groups. As shown recently in a replication effort in social psychology, it can be difficult to replicate an effect found by another lab (Open Science Collaboration, 2015).

Conducting a new meta-analysis that includes all those studies as well as more recent studies, in addition to including a wider variety of behaviours, can determine whether the found effects are lab specific or more universal.

More recently, a meta-analysis of the question-behaviour effect related to health behaviour included 33 studies and found an effect size of $d = 0.09$ (Rodrigues, O'Brien, French, Glidewell, & Sniehotta, 2014). Compared to the other two meta-analyses, this study included papers from a range of different authors and labs. However, the meta-analysis only focused on health behaviours instead of a wide range of behaviours, which leaves the question of what the general effect of question-behaviour effect interventions is. Also, the authors made decisions in extracting the data, which give cause for caution in interpreting their findings.

In their paper, they focus on health behaviours. Since the studies included in the meta-analysis used different target behaviours, a standardised effect size was calculated (Cohen's *d*). Based on how Cohen's d is calculated, a positive effect size means that the experimental group has a higher mean score than the control group, while a negative effect size indicates the opposite. So if, for example, a study on blood donation (Godin et al., 2008) finds a positive effect of asking prediction questions on blood donation behaviour, this means that the group that has been asked to predict their behaviour donates more blood than the control group. However, health can be improved not only by performing certain behaviours more often (e.g. more exercise), but also by performing other behaviours less often (e.g. eating less unhealthy food). In the latter case, the expectation would be to find negative effect sizes, as the experimental group will show a lower score of unhealthy behaviour compared to a control group. This is exactly what a study on eating less unhealthy snacks shows (Levav & Fitzsimons, 2006, Study 2). They found a large negative effect ($d = -1.01$), showing that after answering a prediction question regarding healthy eating, participants were less likely to

choose the fatty food option. When including this result in a meta-analysis, the effect size needs to be transformed into a positive effect size, so that across the meta-analysis positive effect sizes indicate improving health, while negative effect sizes indicate deteriorating health. However, in the meta-analysis on health behaviour by Rodrigues et al. (2014), the negative effect size was reported, thereby decreasing the overall effect size.

Another example relates to the often-heard critique that meta-analyses compare apples and oranges. When investigating the effectiveness of a social influence technique like the question-behaviour effect, conditions included in the meta-analysis should be as close to a control condition and an experimental condition that, as far as possible, only consists of this intervention. An interesting study by Todd & Mullan (2011) compared three conditions, a control group, a prediction only condition and a prediction condition with an additional intervention. For meta-analytic purposes, the control condition and prediction only condition should be compared, instead of the prediction with additional intervention. However, Rodrigues et al. report the latter, which seems to have reduced the reported effect size for that study.

Another paper on the question-behaviour effect described two studies, where Study 2 was a replication of Study 1 (a standard question-behaviour effect experiment) with the addition of a vague question condition compared to the original, specific, experimental question (Sprott, Smith, Spangenberg, & Freson, 2004). The authors explicitly state that "Control and specific predictions were identical to those described in Study 1." (Sprott et al., 2004, p. 1184). This would offer the option of including three comparisons (Study 1, Study 2 Control/Vague, Study 2 Control/Specific), while Rodrigues et al. only included the third option, which may have led to an overestimation of the effect size.

In addition to conditions varying across studies, another important point in meta-analytical research is that, when conducting question-behaviour effect research by sending

questionnaires to peoples' homes or via e-mail, there is a need to control for a selection bias. This means that all participants of all conditions need to be included, instead of only including the participants who returned a completed questionnaire, especially if the control group is not asked to fill in a questionnaire. In their paper, Cioffi and Garner (1998) took this into consideration, but the effect size reported in the meta-analysis by Rodrigues et al. (2014) seems to be based on the returned questionnaires by the experimental group and all of the participants in the control group, likely to have resulted in an overestimation of the effect size for that study in the meta-analysis.

Overall, the question-behaviour effect has been studied in three interesting meta-analytic studies, but given the limitations, there is a need for a meta-analysis that focuses on all research streams of the question-behaviour effect, that does not limit itself to one specific type of behaviour and that assesses all studies conducted on this topic since the milestone paper by Sherman (1980). Such a meta-analysis would result in an updated effect size estimate while also providing information on a possible publication bias, together with insights on the universality of the question-behaviour effect[1].

2.4 Explanations

While the use of the label 'question-behaviour effect' implies that there is only one effect, it does not answer the question of what causes the effect to occur. In this section, empirical research and theoretical papers discussing the underlying mechanisms of the question-behaviour effect are reviewed.

[1] Since completing the literature review and meta-analysis, another meta-analysis on the question-behaviour effect has been published by Wood et al. (2015). That meta-analysis is discussed in Chapter 8: Literature Update.

2.4.1 Cognitive Dissonance Theory

One suggested underlying mechanism is cognitive dissonance (Festinger, 1957). According to Festinger, people have a need to be consistent and when they feel they are inconsistent, for example when two of their cognitions do not match, this gives them a feeling of dissonance. Since cognitions can be attitudes (e.g. "I should exercise") as well as a person's own behaviour (e.g. "I haven't exercised this week"), a discrepancy between attitudes and behaviours can also lead to feelings of dissonance. People who experience dissonance have a need to resolve this feeling. Festinger stated that to resolve dissonance, one of the held cognitions would need to change, so that it is in line with the other. In the exercising example, this would mean that participants either change their cognition "I should exercise" to something similar to "exercise is not important", or they change their cognition "I haven't exercised this week" by exercising.

Cognitive dissonance as explanation of the question-behaviour effect suggests that people make a prediction about their future behaviour based on what they want to do, what they expect others will want them to do and possibly what the experimenter wants to hear. Because participants have answered that they will perform a certain behaviour, they usually overestimated their actual behaviour. This induces dissonance between what they say they will do (the socially desirable behaviour) and what they did in the past (not the socially desirable behaviour). To reduce this dissonance, they either need to change their answer to the prediction question, or behave in line with their prediction. Since they cannot change their answer to the prediction question, the only way to reduce the dissonance is to act in line with the prediction they made. Research on cognitive dissonance as underlying mechanism of the question-behaviour effect has grouped under the label *self-prophecy effect*, a term coined by Greenwald and colleagues who investigated the effects of prediction to vote on actual voting behaviour (Greenwald et al., 1987).

Spangenberg and colleagues investigated experimentally whether cognitive dissonance could serve as underlying mechanism of the question-behaviour effect (Spangenberg, Sprott, Grohmann, & Smith, 2003). In a series of studies, they manipulated downward comparison as this is known to be a coping mechanism for cognitive dissonance (Hakmiller, 1966). They found that asking participants to answer a prediction question about their peers before answering the question in relation to themselves resulted in lower psychological discomfort. This same result was found after participants had the option to self-affirm (Steele & Liu, 1983; Steele, 1988) after answering the prediction question. Self-affirmation is the process of reducing dissonance by casting the 'self' in a positive light through affirming an important aspect of the self-concept. To investigate whether self-affirmation might also attenuate question-behaviour effects, they designed a study in which participants were asked to predict whether they would support the American Cancer Society, after which some participants received a self-affirmation task. At the end of the web-questionnaire, participants were asked to fill in a short survey for the American Cancer Society. Those in the prediction only group were more likely to do so compared to the control group and prediction plus self-affirmation conditions, showing that self-affirmation can attenuate question-behaviour effects.

Additionally, they set out to investigate the need for personal contact in question-behaviour effect interventions (Spangenberg et al., 2003). In a study on recycling behaviour, they found that no personal contact in administering the question-behaviour effect intervention was needed for the intervention to be effective. Instead of personal visits or phone calls as used by Sherman (1980), they chose to place signs with the prediction question in and around a university building to see whether students and staff were more likely to recycle their rubbish in the period after the signs had been placed. While this study used a

quasi-experimental design as no real control group was used, the results suggest that mass-communicated questions can influence subsequent behaviour.

They found the same results when this method was applied to a different behaviour, attending a health club. Health club users who received a prediction question through a mailed questionnaire were more likely to attend the health club than people in the control groups. Interestingly, a statement that people should work out at the health club had a smaller effect on health club attendance than when the same statement was turned into a prediction question. Since both statements should activate attitudes towards working out at the health club, it seems that merely activating attitudes is not sufficient to change behaviour.

Spangenberg and colleagues provided more evidence for cognitive dissonance as the underlying mechanism of the question-behaviour effect by running a series of experiments in which different aspects of the question-behaviour effect were covered (Spangenberg et al., 2012). In Study 1, they asked participants about their future recycling or donation to charity behaviour first and measured their recalled past recycling and donation behaviour after a filler task. Since participants did not have an opportunity to change their behaviour within this timeframe, any difference in recalled past behaviour must be caused by the cognitive dissonance as the participants could only be lying about their past behaviour. Results showed that answering the prediction question first increased the self-reported past behaviour. In two further studies they showed that participants who were asked prediction questions also showed changes in how they perceived their peers. Participants who were asked about their own cheating behaviour reported more cheating by peers compared to participants who were not asked this question. The participants who were asked about their recycling intentions reported more recycling by their peers compared to the control condition.

2.4.2 Attitude Activation

Another explanation of the question-behaviour effect is attitude activation (Morwitz et al., 1993). This explanation suggests that by asking a question about future behaviour, attitudes that are associated with the questioned behaviour are activated. People then use these attitudes to decide what they will do in the future and answer the future behaviour question in the same way.

Morwitz and colleagues investigated how measuring intentions affects purchase behaviour regarding expensive products: cars and personal computers (Morwitz et al., 1993). In this study, participants were asked to complete surveys every six months in which they were asked about their intentions towards buying a personal computer or buying a car. The results showed that asking participants questions about intentions toward purchasing either product resulted in more of these products being bought by these participants compared to participants who did not receive the survey. Participants reporting low levels of intent were less likely to purchase these products later on. However, prior experience with the product moderated the question-behaviour effect, showing that people with limited experience were more likely to purchase the product afterwards. They used the label *mere-measurement effect* to describe these findings.

Fitzsimons and Williams (2000) discussed the possibility of automatic versus effortful processes underlying the question-behaviour effect. They found that the effect of asking questions is not due to deliberate processes but instead is caused by automatic cognitive processes. They suggested that when people are asked questions about their behaviour, this activates automatic categorisations that are used to decide whether or not to perform the behaviour.

Morwitz and Fitzsimons (2004) investigated how a general prediction question influences candy bar choice. They found that when participants were asked to predict

whether they would buy a Canadian chocolate bar if it became available in the US, these participants were more likely to choose a chocolate bar out of a selection of five bars that they had positive and accessible attitudes towards compared to a control group that was not asked a prediction question. In addition, participants in the prediction conditions were also less likely to choose a brand towards which they had negative accessible attitudes. While these findings provide some evidence that attitude activation might play a role in decision making processes after completing a prediction question, the findings are related to a situation in which people have choose one option over the other, which is different compared to the studies investigating whether people are more likely to perform/not perform a behaviour after being asked a prediction question.

Additional research on brand choice shows that asking questions about behaviour related to a specific brand results in a higher state of activation of the brand which is attenuated after making a brand choice related task (Van Kerckhove, Geuens, & Vermeir, 2011).

Chandon, Morwitz and Reinartz (2005) used structural equation modelling to investigate how measuring intentions to purchase products was related to actual behaviour. They suggest that self-generated validity, the inflation of the association between intentions and actual behaviour, could play a role in the question-behaviour effect literature regarding purchasing behaviour.

The authors focused on the data from earlier studies on purchasing behaviour (i.e. Chandon, Morwitz, & Reinartz, 2004; Morwitz et al., 1993) as input for their model and found that the correlation between intentions and behaviour increased by 58% in the surveyed groups compared to the control conditions. They concluded that people with strong intentions to perform a behaviour were more likely to do so after being surveyed, while people with low intentions showed the opposite effect. This fits into the research on attitude activation as

underlying mechanism of the question-behaviour effect, as thinking about attitudes regarding a behaviour could reduce or inflate the chance of performing said behaviour. While the authors discard social norms – which behaviours are considered normative in a group of peers – as underlying mechanism by stating that these norms would influence everyone in the same way instead of strengthen or weaken the likelihood of changing behaviour based on pre-survey intentions, it is unclear whether this assumption is warranted.

For example, research has shown that people differ in their preference for consistency, or how likely they are to change their behaviour to make sure the attitudes, norms and behaviour towards a certain behaviour are consistent (Cialdini, Trost, & Newsom, 1995). It is possible that social norms do not apply to consumer behaviours but in a time where ordering online (Chandon et al., 2004) and buying a PC (Morwitz et al., 1993) were not as common as they are today, some form of social status or norms might have been at play.

2.4.3 A Critical Review of the Question-Behaviour Effect

When Sprott and colleagues (2006) coined the term "question-behavior effect" they effectively combined different streams of research (i.e. self-prophecy and mere-measurement effect research) under the same umbrella term: question-behaviour effect. Later, a critical review of the question-behaviour effect was published (Dholakia, 2010), in which research on the question-behaviour effect was discussed while taking into account those different streams. He distinguished three different types of question-behaviour effect research: lab-based and field-based mere-measurement effect research, and self-prophecy effect research.

Dholakia suggested that lab-based mere-measurement effect research focuses mainly on brand preference, with choice as a dependent measurement. These studies are often quite short and the measurement of the dependent variable occurs relatively soon after the participant answers the intervention questions. In contrast, field-based mere-measurement

studies include brands with which the participants are already familiar and are carried out over longer periods of time. Both types of research focus on consumer behaviour and can measure actual behaviour (e.g. brand choice in lab studies and purchasing behaviour in field studies).

Where mere-measurement effect studies often focus on consumer behaviour and ask questions about the customer experience and satisfaction, the self-prophecy effect studies use predictions about future behaviour as an independent factor in experiments. Dholakia suggested that the self-prophecy effect could be used to explain findings that cannot be explained by a mere-measurement effect approach, making the distinction between attitude activation (mere-measurement effect) and cognitive dissonance processes (self-prophecy effect). Since the findings in the self-prophecy effect literature cannot be explained by attitude activation, Dholakia suggests that this means that the two effects have different underlying mechanisms. As Dholakia first used attitude activation to explain the effect and used cognitive dissonance only to explain the findings that attitude activation cannot, it remains unclear whether cognitive dissonance could explain the findings of attitude activation research as well.

2.4.4 Ease of Mental Representation

While attitude activation and cognitive dissonance are the most extensively investigated mechanisms of the question-behaviour effect, researchers have suggested other explanations for the effects of asking questions on subsequent behaviour.

In a series of experiments, Levav and Fitzsimons (2006) posited that ease of mental representation of the behaviour under investigation would influence the effects of asking prediction questions on subsequent behaviour. They tested the hypothesis that the easier it is to imagine performing a behaviour, the more likely it is participants will be performing this

behaviour after answering a related prediction question. They investigated this hypothesis in several ways. In one study, they altered the prediction question in two experimental groups, with one group answering the question regarding themselves, while another group answered the question as if it was about their average classmate. Participants who answered a prediction question regarding flossing their teeth were more likely to floss in the following two weeks than participants who answered the same question about a classmate.

In a second study, they showed that asking people whether they would eat fatty foods or asking whether they would *not* eat fatty foods both reduced the number of participants choosing the fatty food option in a subsequent taste test. However, asking a question regarding avoiding eating fatty foods rather than not eating fatty foods reduced the number of participants choosing the fatty food option significantly more compared to the other two prediction questions.

A subsequent manipulation check revealed that answering questions phrased as "will you not" takes significantly longer than answering questions that are phrased as "will you" or "will you avoid", which is, according to the authors, proof that ease of mental representation is at play. However, while the avoidance question showed a significant decrease in fatty food choice compared to the other two experimental conditions, the "will you not" and "will you" questions both showed similar, significant decreases in behaviour compared to a control group.

A third study investigated ease of representation by focusing on frequency of behaviour instead of positive or negative questions to investigate the likelihood of participants flossing their teeth or reading for pleasure. They asked people questions related to either regular (7 or 21 times per week) or irregular (2 or 8 times per week) occurrences of the behaviours. The results showed that for regular behaviours (flossing teeth) asking questions about regular occurrences of behaviours increases the effect, while this effect is not

found for irregular behaviours (reading). The authors conclude that this adds to the ease of mental representation hypothesis, as it is easier to imagine doing something on a regular, rather than an irregular basis.

2.4.5 Motivational States

Most of the studies on the question-behaviour effect have investigated behaviours about which people have an a priori belief, such as blood donation (e.g. Godin et al., 2014), eating healthy foods (e.g. Levav & Fitzsimons, 2006) or going to the gym (e.g. Spangenberg, 1997). Van Kerckhove and colleagues investigated the likelihood of buying a specific, new brand of chocolate in order to remove prior beliefs about the behaviour and to investigate the influence of motivational states (Van Kerckhove, Geuens, & Vermeir, 2012).

In a series of studies, they showed participants new brands of chocolate and asked an intention question related to which brand the participant would choose. They found that when participants answered intention questions, these intentions became activated. In turn, these intentions were the basis for actual changes in behaviour. Once a brand had been chosen, the intention toward that brand moved from activation to inhibition. In addition, a longer time period between the intention question and brand choice did not reduce the effect, suggesting that a specific intention stays activated until the participant has a chance to act upon this intention.

2.4.6 Action Control as Explanation of the Question-Behaviour Effect

Gollwitzer and Oettingen (2008) proposed *action control theory* (Gollwitzer, 1990) as explanation of the question-behaviour effect. They suggested that asking questions activates implicit norms rather than create positive implicit norms, which would mean that the

direction of a question-behaviour effect intervention is determined before the question is asked rather than as a result of the question frame.

2.4.7 The Role of Social Identity in Question-Behaviour Effects

Perkins and colleagues investigated whether social identity instead of cognitive dissonance might drive the question-behaviour effect (Perkins, Smith, Sprott, Spangenberg, & Knuff, 2008). They related the outcomes of two question-behaviour effect interventions to levels of self-esteem. They argued that self-esteem should be reduced if dissonance is present, as dissonance theory would predict a drop in self-esteem based on dissonance between social norms (recycling is a good thing) and their behaviour (not recycling). However, if people predict in line with their social identity, they do not experience dissonance and therefore no drop in self-esteem is expected. They tested this hypothesis in two experiments. In the first study, using Implicit Association Tests (IAT, Greenwald, McGhee, & Schwartz, 1998), they found that self-esteem increased in the prediction group compared to the control group, indicating a social identity factor in question-behaviour effect research. The second study focused on manipulating self-esteem before answering a prediction question, to investigate whether this would confirm the findings of the first study. They used the Remote Associates Test (RAT, McFarlin & Blascovich, 1984) to manipulate self-esteem. This task sets out to influence self-esteem by letting participants complete a three-word set by adding a fourth word. A list of easy word-sets was used to increase self-esteem, while a list of difficult word-sets was used to decrease the self-esteem of participants. After completing this task, half of the participants were asked a prediction question. The results showed that threats to self-esteem were reduced after making a prediction about future behaviour, confirming the results of the first study that social identity, rather than cognitive dissonance may underlie the question-behaviour effect.

2.4.8 Theoretical Papers Relating to the Question-Behaviour Effect

Apart from experimental and correlational studies, some papers discussed the theoretical underpinnings of the question-behaviour effect. In a review of the earlier discussed issues of the role of this effect in increasing vice behaviour, Spangenberg and colleagues suggest the ideomotor theory as underlying mechanism of the question-behaviour effect (Spangenberg, Greenwald, & Sprott, 2008). They suggest that asking people questions about their behaviour activates a mental image of the behaviour in the minds of the participants and this mental image can then be a guide in changing behaviour. This explanation seems related to goal-setting and implementation intentions as an underlying mechanism of the question-behaviour effect.

The authors stated that the ideomotor theory could explain the question-behaviour effect as it focuses on behaviours that are automatic, unconscious and involuntary. In addition, they suggested that the theory would especially work when participants have prior experience with the behaviour that is questioned. They use the finding that the Williams et al. study (2006) showed an increase in drug use in participants who had used drugs before to suggest this might be due to an ideomotor explanation. While having the ability to perform a behaviour might be a requisite for the change in behaviour to occur, it is unclear whether or not an increase in behaviour after a question-behaviour effect intervention is due to an activation of a mental image. The authors also describe studies that could be conducted to test the ideomotor explanation experimentally. As none of these studies has been published so far, so the question remains whether ideomotor theory is a feasible explanation of the question-behaviour effect.

Morwitz (2005) reviewed the question-behaviour effect literature regarding satisfaction surveys on future purchasing behaviour. She concluded that when peoples' attitudes towards a certain brand were positive, completing a satisfaction survey resulted in an increased

chance of the participants buying the product. The explanation of these findings is described as related to attitude activation and participants behaving in line with their attitudes.

2.4.9 Theories Outside the Question-Behaviour Effect Literature

In an attempt to embed the question-behaviour effect into the larger scientific literature, it has been linked to several other theories. One theory related to the question-behaviour effect is the Hawthorne effect (Miller & Landsberger, 1959) which is used by several researchers to explain the question-behaviour effect (e.g. McCambridge & Kypri, 2011; Zwane et al., 2011). The Hawthorne effect states that once people know that their behaviour is being measured, they are likely to change that behaviour.

While there are some similarities between the question-behaviour effect and the Hawthorne effect, these two phenomena are not the same. The differences between those effects are that the question-behaviour effect does not focus on participants knowing their behaviour is being measured, as several studies show effects even when the participants are not aware their behaviour is being measured (e.g. Spangenberg, 1997). Another difference is that in the studies where participants are aware of a researcher measuring their behaviour, this awareness is present in both control and intervention conditions, so any Hawthorne effect is likely to affect both groups to the same extent.

Another theory that is used to introduce a question-behaviour effect paper is Heisenberg's uncertainty principle as used by Morwitz (2005) or Sandberg and Conner (2009). Heisenberg stated that measuring the location of a particle could influence its movement and vice versa. While researchers could argue that the question-behaviour effect works in a similar way, that measuring behaviour leads to changes in the behaviour, it seems quite a stretch to include a quantum mechanics theory in a paper related to human behaviour.

2.4.10 Conclusion

This section of the literature review shows that there are different approaches to the question-behaviour effect and several theories have been proposed to understand the underlying mechanisms of why asking questions about behaviour influences future behaviour. While attitude activation and cognitive dissonance are the most widely researched explanations, neither seems to account for all the findings in the question-behaviour effect literature. More research into the underlying mechanisms of the question-behaviour effect is needed to understand why the effect occurs and to address any unwanted effects that are expected based on the theory.

2.5 Moderators of the Question-Behaviour Effect

Besides the different study characteristics discussed in the previous section, there are several moderators that have been investigated in the question-behaviour effect literature. This section summarises these moderators.

2.5.1 Specificity of the Intervention Question

One of the questions that arise from the question-behaviour effect literature is how specific the prediction questions need to be in order to have an effect on behaviour and whether a more specific question will result in a larger effect. One of the most specific questions that can be asked in relation to question-behaviour effect research, is an implementation intention (Gollwitzer, 1999), where participants are asked what they will do in a specific situation (e.g. Godin et al., 2014). However, even simple prediction questions can differentiate between more specific and more general predictions as investigated by Sprott and colleagues (Sprott et al., 2004). In two studies, they investigated how signing up for a health and fitness assessment could be influenced by asking people to predict whether or

not they would sign up. More specifically, in Study 1, they provided participants in the experimental condition, which they regarded as a specific prediction condition, with the following text:

> *A health and fitness assessment is locally available to you. The assessment will evaluate your overall physical fitness and health and is offered free of charge to you as a member of the university that you attend. Do you predict that: a. You will not participate in the health and fitness assessment? b. You will participate in the health and fitness assessment?* (Sprott et al., 2004, p. 1182).

They found that asking this question significantly increased the number of people signing up for the health and fitness assessment. In their second study, they used the same methods and question, but added a general prediction condition that was provided the following text:

> *A variety of different activities help to promote an overall healthy lifestyle. Many of these health and fitness activities are offered to you by the university that you attend. Do you predict that: a. You will participate in one or more health and fitness activities? b. You will not participate in one or more health and fitness activities?* (Sprott et al., 2004, p. 1184).

They found an overall effect of prediction on interest in the health and fitness assessment. As in Study 1, the specific prediction condition significantly increased interest compared to the control group. And as the authors hypothesised, the specific prediction condition also significantly differed from the general prediction condition. Compared to the control condition, the general prediction condition did not show a significant effect, signalling that a specific prediction is key in influencing future behaviour.

2.5.2 Self-Monitoring as Moderator of Question-Behaviour Effect

Spangenberg and Sprott (2006) investigated self-monitoring as moderator of the question-behaviour effect. In two studies, a self-monitoring scale was used to assign participants to either a low or a high self-monitoring group based on their self-monitoring scores. Participants in these two groups then were asked to predict whether or not they would take part in a health and fitness assessment, or answered a control question after which they had the opportunity to sign up for such an assessment.

Results showed that only the participants in the low self-monitoring condition showed an increase in signing up for the health and fitness assessment, while the participants in the high monitoring condition showed no significant increase. These results were replicated in a second study with the same paradigm, where participants were asked to predict whether or not they would donate a few hours of their time to help the American Cancer Society. Here, they also found that the effect was only obtained in the low self-monitoring participants.

The findings presented in this paper are interesting, as they present limitations of the question-behaviour effect as intervention technique. It seems that being asked prediction questions influences only participants with a low self-monitoring score suggesting social factors, and not attitude activation, underlie the question-behaviour effect.

2.5.3 Personal Norms

Another moderator of the question behaviour effect is the use of personal norms (Chandon, Smith, Morwitz, Spangenberg, & Sprott, 2011). They investigated the influence of predictions about future behaviour and personal norms on the likelihood of repeating past behaviour. Results showed that for behaviours related to weak personal norms, people tend to behave more in line with past behaviour, while making predictions about behaviours related to strong personal norms increased the likelihood of acting according to those predictions.

They also investigated whether priming people with past behaviour concepts or personal norm concepts influenced the outcome. They found that behaviour repetition increased when people were primed with past behaviour before answering a future prediction question, but that behaviour repetition decreases when people were primed with personal norms. Two field studies showed that behaviours with low personal norms (online grocery shopping) positively influenced the correlation between past and future behaviour, while behaviours related to high personal norms (exercising at a health club) negatively influenced the correlation between past and future behaviour.

2.5.4 Stability as Factor Influencing the Question-Behaviour Effect

Lawrence and Ferguson (2012) investigated how the (in)stability of context and behaviour could relate to the question-behaviour effect. They suggested that a behaviour which is regular and stable is more likely to be influenced by past behaviour than by answering intention questions. In addition, they suggested that if the context of a behaviour changes, the behaviour changes in line with what is appropriate to that context. For example, if people are asked about their drinking intentions in a bar, they are more likely to drink alcohol than when the setting is unrelated to alcohol use. In a series of studies on both stable behaviours (i.e. driving fast, smoking and drinking alcohol) and unstable behaviours (i.e. exercise, dieting and condom use), they discovered that context stability is key in changing behaviour by asking intention questions.

2.5.5 Processing Fluency as Moderator of the Question-Behaviour Effect

Janiszewski and Chandon (2007) focused on the mere-measurement explanation of the question-behaviour effect and investigated how processing fluency could explain the difference in findings of question-behaviour effect interventions across studies. They

suggested that the ease with which people can process the attitudes towards a behaviour moderates the effect of a question-behaviour effect intervention. The easier it is to process the attitudes, the stronger they are and therefore, the more likely the participant is to change their behaviour after answering prediction and attitude questions. It seems likely that behaviours that are easier to process are influenced to a greater extent. The question remains whether this is due to process fluency or that easier to process behaviours are also easier to perform.

2.5.6 The Mediating Role of Attitude Accessibility

Wood and colleagues investigated the mediating role of attitude accessibility (Wood, Conner, Sandberg, Godin, & Sheeran, 2014). In addition to a Theory of Planned Behaviour (TPB) questionnaire about healthy eating, participants also completed an attitude accessibility task. This attitude accessibility task consisted of a reaction time task in which participants had to judge one word at a time by pressing one of two buttons labelled "good" and "bad." The reaction times were used as indication of whether attitudes were activated faster after completing the TPB questionnaire. After this task, participants had the opportunity to choose a healthy or fatty snack.

The results showed the basic question-behaviour effect finding that asking questions influences behaviour as the number of participants choosing a healthy snack was significantly higher in the prediction condition compared to the control conditions. In addition, the participants in the experimental condition had a significantly shorter reaction time in the attitude accessibility task, indicating that completing the experimental questionnaire activated their attitudes. Their reaction time correlated significantly with the number of healthy snacks chosen, and analysis indicated a mediating role for attitude accessibility.

The question remains whether this effect can be found when different questions are asked. A TPB questionnaire usually includes attitude questions, so the attitude questions

asked in the TPB questionnaire might explain the findings that attitudes are activated after completing a questionnaire. Future research in this area could investigate whether the effect can also be found after asking participants other questions about healthy eating such as intentions or prediction questions as used by Levav and Fitzsimons (2006). If those types of questions followed by an attitude accessibility task showed the same results, this would rule out the effect of the attitude questions asked as a cause of this mediating role.

2.5.7 The Question-Behaviour Effect and Normative Beliefs

In two studies, Sprott and colleagues investigated the role of normative beliefs, what people think they should do, in the question-behaviour effect (Sprott, Spangenberg, & Fisher, 2003). In a first study, they investigated the effect of normative beliefs about food on subsequent snack choice (high or low fat). They found that answering prediction questions about behaviour only influenced subsequent behaviour when people had strong normative beliefs.

In a second study that focused on health behaviours, a similar pattern emerged with participants being more likely to sign up for a health and fitness assessment after answering a prediction question when they had strong normative beliefs, but not when normative beliefs were weak. Both studies suggest that strong normative beliefs are necessary for a question-behaviour effect intervention to have any effect. However, both studies used an intention measurement as dependent variable. The participants in the first study did not actually buy the chosen snack and the participants in the second study were asked to sign up for the health assessment rather than measuring whether they actually turned up for the assessment. Further research investigating the hypothesis that strong normative beliefs are a requirement for a successful question-behaviour effect intervention by measuring actual behaviour could be used to assess the validity of these findings.

2.5.8 Asking Multiple Questions

Van Kerckhove and colleagues looked into how asking multiple prediction questions could affect the effectiveness of the intervention (Van Kerckhove, Geuens, & Vermeir, 2009). They found that adding a smaller prediction question (whether participants would take part in one scientific study in exchange for a movie ticket) before asking the actual prediction question (whether participants would take part in three scientific studies in exchange for a movie ticket) increased the percentage of participants wrongfully predicting they would do so compared to the actual behaviour of a control group. In addition they found that this method increased the percentage of participants taking part in the scientific studies.

In a second study, the authors investigated whether the 'well-formedness' of the question moderates the intervention's effectiveness. The authors added a manipulation proposed by Bagozzi and Yi (1989) who suggested the addition of a relevant task after the intervention or a distraction task. As the prediction question was related to purchasing sustainable products, the relevant task consisted of "[asking participants] to give their opinions about buying sustainable food products, to write down what they would like to achieve with buying sustainable food products and what they perceive to be the barriers in doing so" (Van Kerckhove et al., 2009 p. 14). They found that both adding a small question first as well as adding the relevant task enhanced the effectiveness of a question-behaviour effect intervention on choosing to buy a sustainable option.

2.6 Methods

As shown in the previous sections, there are several different methods of applying a question-behaviour effect intervention. Methods can differ in terms of structure, type of question, setting and outcome measurement for example. This section covers these different approaches used in the question-behaviour effect literature.

2.6.1 A Method to Investigate the Question-Behaviour Effect in a Single Session

While earlier studies investigated the question-behaviour effect in two sessions (e.g. S. J. Sherman, 1980), where the first session consisted of asking half of the sample a prediction question and the second session, after a time interval (e.g. a day or a week later), consisted of a measurement of behaviour, other methods have been suggested. Spangenberg and Greenwald (1999) tested a one-session method that would make it easier to investigate the question-behaviour effect as participants only need to take part in one instead of multiple sessions. Instead of focusing on real world behaviour, they focused on whether asking participants to predict the ratio of male and female names they would use in a subsequent name-generation task influenced their responses on the task. In this task, the participants were given a first initial of a name and the last name and were asked to complete the first name. This task was designed after a study on gender stereotyping that discovered "an implicit stereotype that associates male (more than female) gender with fame-deserving achievement." (Spangenberg & Greenwald, 1999, p. 69). They found that the participants in the prediction conditions showed significantly less gender stereotyping. However, the effect was only present for male participants and not for female participants.

Since this first one-session question-behaviour effect study, another one-session study design has emerged (e.g. Levav & Fitzsimons, 2006; Williams, Fitzsimons, & Block, 2004). In those studies, the authors convinced participants that the behaviour measurement (choosing a healthy option in a taste test) was in no way related to the prediction question the participants had been asked at the beginning of the study. In the Spangenberg and Greenwald study (1999), no such precautions were taken as this was not an option given the specificity of the prediction question. Caution in conducting single-session question-behaviour effect research is warranted, as there might be a possibility of social desirable responding when using self-reported behaviour measurements as outcome variable.

2.6.2 Attitudes, Intentions and Future Behaviour Predictions

In the question-behaviour effect literature, the type of questions asked under the umbrella of the question-behaviour effect differs. Roughly, there are three types of questions: attitudes, intentions and future behaviour predictions. In addition to these types of questions, some studies add questions about cognitions, norms or past behaviour as a question-behaviour effect intervention. Attitude questions, measuring people's attitudes towards a behaviour, are either asked as a stand-alone intervention (e.g. Chapman, 2001; Van Kerckhove et al., 2012) or included in a satisfaction survey (e.g. Borle, Dholakia, Singh, & Westbrook, 2007). Intentions are used as a stand-alone intervention as well (e.g. Spence et al., 2009), or combined with attitudes, norms and perceived behavioural control in a Theory of Planned Behaviour questionnaire (e.g. Conner et al., 2011; Godin et al., 2008). Future behaviour predictions such as "do you predict…?" or "will you…?", are in most cases used as a brief, stand-alone intervention with a short introduction (e.g. Chandon et al., 2011; Spangenberg & Sprott, 2006).

Some effort has been made to compare these different types of questions experimentally. In a study on compliance to a request to send out two envelopes on specific dates, Chapman (2001) compared single versus multiple measurements of attitudes and intentions. He found that asking intentions was more effective than asking attitude questions and that using multiple measurements (six questions) was more effective than a single measurement.

2.6.3 Theory of Planned Behaviour Questionnaire

Instead of measuring attitudes, intentions or future behaviour prediction questions as independent variable in question-behaviour effect research, some studies used a Theory of Planned Behaviour questionnaire (e.g. Conner et al., 2011; Godin et al., 2011; Sandberg &

Conner, 2009). This type of questionnaire is based on the Theory of Planned Behaviour (Ajzen, 1991), a model to explain behaviour based on an earlier theory, the Theory of Reasoned Action (Fishbein & Ajzen, 1975) that states that the intention to perform a certain behaviour is formed by a person's attitudes and the social norms of the group that person belongs to. The formed intention then leads to behaviour. The theory of planned behaviour expands this model by adding perceived behavioural control, which influences both the intention as well as the actual behaviour directly.

Perceived behavioural control is the perception of a person that he or she can perform the behaviour. The role of perceived behavioural control has been studied in relation to a range of focal behaviours such as road safety (Castanier, Deroche, & Woodman, 2013) and condom use (Prati, Mazzoni, & Zani, 2014) and a meta-analysis of Theory of Planned Behaviour research showed that perceived behavioural control significantly increased the explained variance in behaviour (Armitage & Conner, 2001).

A Theory of Planned Behaviour questionnaire therefore usually includes questions about all these predictors of behaviour; attitudes, norms, perceived behavioural control and intentions. Compared to other question-behaviour effect interventions, this type of questionnaire is relatively long and covers a wider range of concepts related to the focal behaviour in comparison to merely asking attitude questions or a single prediction or intention question.

2.6.4 Question Framing

Not only the type of question differs across studies. There is also some evidence that the way intention questions are framed also influences the outcome of a question-behaviour effect intervention. In a randomised controlled trial on physical activity, Godin and colleagues investigated the effects of asking declarative or interrogative intention questions

on behaviour (Godin, Bélanger-Gravel, Vézina-Im, Amireault, & Bilodeau, 2012). Assigned randomly to conditions, some participants were asked declarative (e.g. I will/I want/I plan to) or interrogative (e.g. Do I have the intention to? /Do I try to?) intention questions related to their physical activity. Two other conditions were similar, but were asked additional questions related to their own moral norms regarding physical activity.

Results showed that asking questions in an interrogative manner increased self-reported physical activity, but the effect was only present when moral norms were not measured. The authors concluded that a form of introspective self-talk can influence participants to take up certain behaviours. While interrogative questions might induce self-talk, it is unclear whether self-talk is activated or merely enhanced by interrogative questions. It is possible that declarative questions also induce self-talk, but to a lesser extent. For example, questions such as "Ask Yourself ... Will You Recycle?" (Spangenberg et al., 2003, p. 51) could induce self-talk by explicitly stating that people need to ask themselves the question, instead of merely asking the intention question.

2.6.5 Measuring Past Behaviour as Independent Variable

Even though most studies in the question-behaviour effect literature use (a combination of) attitude, intention and prediction questions, other research focused on the effectiveness of asking other types of questions about behaviour, such as asking participants about their past behaviour (e.g. Zwane et al., 2011). Those studies focus on whether merely measuring past behaviour influences future behaviour in a social desirable way. If this were the case, this would mean researchers need to take this into consideration when designing longitudinal intervention programmes, since those programmes tend to measure behaviour in a control and an experimental group on several occasions. An effect of past behaviour on

future behaviour would mean that intervention research thus far might have underestimated the effects of behavioural change interventions.

A meta-analysis on brief alcohol intervention trials showed that asking people about past drinking behaviour resulted in decreased scores on the AUDIT (Alcohol Use Disorders Identification Test, (Saunders et al., 1993) and weekly alcohol intake (McCambridge & Kypri, 2011). Alcohol intake on a drinking day was not influenced.

Another study on measuring past behaviour to investigate changes in future behaviour focused on adolescents and adults watching internet pornography (Peter & Valkenburg, 2012). While they expected different question-behaviour effects for adults and adolescents, they found no differences in self-reported behaviour between conditions that had been asked about their past behaviour previously and their respective control groups. This finding seems to suggest that attitude activation is not an underlying mechanism of the question-behaviour effect, as questions about past behaviour should activate attitudes in the same way as, for example, a future behaviour prediction would.

Zwane and colleagues investigated measuring past behaviour through household surveys to investigate how asking questions about the household's present situation influenced future behaviour (Zwane et al., 2011). In a series of field studies they distributed surveys to subgroups from a sample of households about their present situation and measured behaviour afterwards in both the surveyed and non-surveyed groups. In their first study, they found that surveying families in Kenya on disinfecting drinking water increased the amount of water disinfected before use and reduced child diarrhoea significantly. However, the researchers warn that these results might be due to a Hawthorne effect, since the participants in the study knew they were going to be observed after the survey had taken place. In the second study, participants in the Philippines were asked about taking up hospitalization insurance and were offered the option to get such insurance at a later time. This study showed

a non-significant effect (p = .14). The third study focused on health insurance take-up in the Philippines. Results showed an increase in health insurance take-up in the months after the participants had responded to the survey but the effect decreased over time. A fourth study investigated microcredit take-up in Morocco. After the survey, no significant increase in uptake of microcredit acceptance was found. Their fifth and final study investigated whether microloan renewal in India could be influenced by household surveys. The results showed that there was no significant increase in the microloan renewal after filling in a household survey. The researchers explain their findings by stating that in the first experiment, the survey probably acted as a reminder of how to disinfect drinking water. The other four studies in their paper rely, according to the researchers, on non-conscious processes and automatic processing of the information.

2.6.6 Hypothetical Questions

Besides measuring past behaviour, other studies have expanded the types of questions used by investigating whether asking hypothetical questions can influence future behaviour. Fitzsimons and Shiv (2001) investigated the role of hypothetical questions regarding the question-behaviour effect in a series of studies. They found that when participants were confronted with negative information about a politician, this would reduce their likelihood of voting for this politician. The likelihood of voting for the politician was even lower when the participants had to answer a hypothetical question in which the negative information was embedded in the form of "if you would hear [negative information] would your opinion of him increase or decrease?" Although the difference between the negative and hypothetical conditions was not significant, the drops in likelihood of voting for the politician were significant compared to a control group that did not receive any information. While this finding indicates that hypothetical questions might have some effect, the outcome variable

was an imaginative vote and not actual behaviour like some of the other question-behaviour effect studies. To correct this, a second study was conducted. In this study participants were asked how positive information about eating fatty foods would change their opinion of fatty foods. The results showed that this question increased fatty food as snack choice in a subsequent taste test, but only when the information in the hypothetical question was extremely positive compared to a more subdued version.

However, in this second study, there was no condition in which the facts of the hypothetical questions were conveyed without asking a question. As their first study did not show a significant difference between the fact and hypothetical question condition, it is unclear whether asking hypothetical questions influences behaviour, or whether it is merely conveying the information that has a meaningful effect.

Moore and colleagues investigated the underlying mechanisms of asking hypothetical questions (Moore, Neal, Fitzsimons, & Shiv, 2012). They found that asking hypothetical questions activated knowledge in the direction of the question. So positive hypothetical questions activate positive knowledge while negative questions activate negative knowledge. Prior beliefs in the direction of the hypothetical question increased the effect. In addition, they found that drawing attention to the question attenuated the effect of the question on subsequent behaviour. This finding is of importance to researchers interested in asking participants questions about their behaviour without setting out to influence their behaviour.

2.6.7 Intervention Setting

Apart from different types of questions, the question-behaviour effect literature also differs greatly in terms of setting of the study. As the question-behaviour effect literature generally focuses on changing behaviour, interventions should not only be tested in the lab, but in other settings as well. The first sets of studies on the question-behaviour effect used

personal contact (i.e. personal visits or phone calls) with the participants to ask them about their intentions towards the focal behaviour (e.g. Greenwald et al., 1987; S. J. Sherman, 1980). Later studies used other settings such as paper and pencil questionnaires distributed by mail (e.g. Morwitz et al., 1993) or classroom questionnaires (Chapman, 2001). These approaches differ in terms of personal contact as calling or visiting a participant involves more personal contact and attention from the researchers compared to classroom or mailed questionnaires.

In studies where the participants received personal calls or even visits from the researchers, the participants' attention is much more focused and they are forced to think about their intentions and to make a prediction about the future. In contrast, receiving a questionnaire in the post might not get the same attention and participants will feel less obliged to complete the questionnaire and send it back to the researchers.

Rather than researchers sending questionnaires via mail, some studies have been conducted by using customer satisfaction surveys sent out by companies (e.g. Borle et al., 2007; Morwitz, 2005). These surveys, often long and covering several areas of the customer experience, can include predictions about future behaviour such as "Would you buy this product again?" or "How likely are you to buy this product in the next six months?" While these questions are similar compared to the attitude, intention and prediction questions described earlier, there are a couple of differences as well.

An advantage of customer satisfaction surveys is that, as stated before, this type of questionnaire is less personal as they are usually distributed by mail. This improves anonymity and allows a participant to speak freely, thereby reducing social desirable responding. The disadvantage of customer satisfaction surveys is the risk of a low response rate as not everyone who is selected to take part will complete and return the questionnaire. Since the effects of the questionnaire are compared to a control group that did not receive a

questionnaire, this increases the possibility of a selection bias. This selection bias results in an experimental group of participants that is more interested in the product or brand and made the effort to complete their questionnaire. These customers might also be more likely to purchase another product from the same brand. In the control group that does not receive a questionnaire, there is no method to differentiate between satisfied and dissatisfied customers and therefore, the average number of purchases in this group will be lower compared to a subgroup of satisfied customers. Controlling for this selection bias is key when measuring the effectiveness of satisfaction surveys as social influence technique.

2.6.8 Field Studies

Some researchers used field experiments to investigate the applicability of the effect in a real world setting. For instance, Chandon, Morwitz and Reinartz (2004) investigated how asking intentions could lead to an increase in repeated online grocery purchases. They found that, after answering intention questions, customers were more likely to buy again from the online grocery and that the time between their original order and the repeated purchase was shorter compared to a control group. The researchers point out that this effect decreased rapidly after three months.

Dholakia and Morwitz (2002) measured customer satisfaction of a financial services company to see whether this would influence consumer behaviour. They found that customers who received a satisfaction survey were more likely to purchase one or more products compared to a control group. They also found that this effect lasted up to eight months, after which the effect decayed. This relatively long-term effect is interesting, as the intervention is small compared to the time frame of their research. Additional research has shown that satisfaction surveys might be beneficial in the long term, but not in the short term (Dholakia, Singh, & Westbrook, 2010), the reason being that customers were likely to

postpone purchases right after taking part in the satisfaction survey, but that overall, on the long term, the effects of sending satisfaction surveys were positive. This suggests that companies should send out satisfaction surveys, but not too often, as that would influence customers to postpone their initial purchases.

In an unpublished manuscript, Allen, Dholakia and Basuroy (2013) used online panels for their field studies using customer satisfaction as the independent variable. They found that this type of online questionnaire had similar effects to earlier research on customer satisfaction on future purchasing behaviour.

2.6.9 Measuring Outcome Behaviour

The outcome of question-behaviour effect interventions is often measured in terms of behaviour. This behavioural measurement either consists of self-reported behaviour (e.g. Todd & Mullan, 2011) or an objective behavioural measurement (van Dongen et al., 2013). Self-reported behaviour might be more prone to social desirable responding as the participant can easily lie about what they have done. This is different for the objective behavioural measurements, where behaviour is measured in an objective way, sometimes even without the participants being aware of the measurement (e.g. Spangenberg, 1997).

Sprott and colleagues focused on this difference in outcome measurements of question-behaviour effects in two studies (Sprott, Spangenberg, & Perkins, 1999). The first study focused on actual recycling behaviour among students living in dormitories. Each dormitory received either an intervention or a control survey. Analysis showed that students in dormitories that had received the intervention survey recycled more tin cans than the control group. Since the experiment was very time consuming – they had student assistants go to the dormitories every week and count the amount of tin cans – a second experiment was

carried out to try whether self-reporting could be used as an easier way of measuring behaviour and would provide reliable data as well.

In this second study, five focal behaviours were tested: drinking and driving, recycling, eating a healthy snack, cheating in class and exercising. Several of these behaviours have shown a question-behaviour effect in other studies so the authors expected differences between experimental and control groups when using a self-reported behaviour outcome as dependent variable. This was not the case. The students did not increase any of the five behaviours compared to a control group. It might be that the intervention was not effective in this study. However, since the focal behaviours have been tested in question-behaviour effect experiments before, and had shown significant changes in behaviour, this seems unlikely. The authors therefore conclude that self-reported behaviour cannot be used as an easy and reliable way to measure the effect of a question-behaviour effect intervention.

2.6.10 Not Answering Questions as Influence Technique

So far, all described studies focused on how answering questions about behaviour influenced behaviour. Cioffi and Garner (1998) studied how *not* answering questions can influence behaviour. In their study, they investigated how email messages could influence the likelihood of students donating blood at a blood drive the following week. In the email message, they altered the question between conditions. Three experimental conditions included a prediction to donate question, but how students should respond to this question differed between conditions. In one condition (active-yes condition), students were told that if they predicted to donate blood, they should reply to the email with “yes” and that if they predicted not to donate blood, they did not need to reply to the email. In a second condition (active-no condition), the opposite was asked of the students, so that students predicting not to donate blood had to reply to the email. In a third experimental condition (forced-choice

condition), students were asked to reply to the email regardless of their prediction.

The results showed that asking to reply when students predicted not to donate blood was the most successful intervention condition, with 12.3% of the students in this condition donating blood compared to 8.3% and 5.7% in the active-yes and forced-choice conditions respectively, showing a significant increase in donors compared to a control condition that did not receive any message (5.4% of this group donated blood).

This study provides some evidence for a consistency explanation of the question-behaviour effect as *not* answering they would *not* donate blood lead to an increased effect compared to a forced choice condition where both intentions to donate and not donate required replying to the email.

2.6.11 Conclusion

This methods section in the literature review shows that there are several different factors that vary in the question-behaviour effect literature. Not only the types of behaviour that are used, but also the time frame, setting, type of outcome measurement and type of questions that is asked during the question-behaviour effect intervention differ across studies. Comparing these factors through meta-analysis or experimental research could shine light on the effectiveness of the question-behaviour effect regarding these different factors.

2.7 Applicability

Apart from understanding why the question-behaviour effect occurs, there is also a need to address the applicability of the question-behaviour effect as social influence technique. In this section, studies investigating the use of the question-behaviour effect in the wider behavioural change literature are discussed.

2.7.1 Comparing the Effectiveness of Different Types of Questions

As discussed earlier, the question-behaviour effect literature uses several different types of questions to investigate their influence on future behaviour. Comparing the effects of these questions across studies is difficult as each study uses different samples, settings and focal behaviours. While most question-behaviour effect studies focus on the effect itself and applies to a wide variety of behaviours, a small body of research has investigated the effectiveness of question-behaviour effect interventions compared to other influence techniques.

To investigate the differences between these types of questions, Godin and colleagues compared multiple question types experimentally (Godin et al., 2010). They compared a question-behaviour effect intervention with implementation intention interventions to investigate the use of asking questions on future blood donation behaviour. In addition, they investigated whether questionnaire completion is a requirement for detecting question-behaviour effects. They also investigated whether adding anticipated regret - to what extent participants would regret not giving blood - to the behavioural or implementation intention question lead to different outcomes. The authors sent questionnaires to novice blood donors and measured donation frequency at 6 and 12 months after sending the questionnaires.

At both 6 and 12 months, measuring behavioural intentions did not result in an increased number of blood donations compared to a control group. The addition of anticipated regret did not alter these findings. The implementation intention question did result in an increase in donation behaviour, with the implementation intention only question showing higher number of donations at both the 6 and 12 month mark and implementation intentions plus anticipated regret only showing an effect after 12 months. A more interesting finding is that questionnaire completion seems a requirement for any question-behaviour effects. Subgroup analysis on whether participants did or did not complete the questionnaire

showed that both behavioural intention conditions outperformed the control group when the questionnaire was completed compared to when this was not the case. However, the implementation intention conditions outperformed the behavioural intention conditions at both time points.

While these findings provide some evidence that completing a questionnaire is necessary for a question-behaviour effect to occur, it is difficult to determine a causal relation. It could be that people who are more eager to donate blood before receiving the questionnaire are also more likely to complete the questionnaire, thereby skewing the results. More research on this topic is needed in order to establish a causal link between questionnaire completion and question-behaviour effects.

2.7.2 Applicability Outside the Area of the Question-Behaviour Effect

The findings of in the question-behaviour effect literature are not just relevant when designing a behavioural change intervention based on the theory, but also outside the question-behaviour effect field. For example, Ferguson and Lawrence (2013) added conditions with mere-measurement concepts to their research to rule out any unwanted effects of these type of questions on their outcome variable. Similarly, McCambridge (2015) addressed the importance of question-behaviour effect findings in research on the effectiveness of interventions. He suggested that question-behaviour effects create a new type of bias in experimental research as measuring behaviour influences subsequent behaviour. He stated that this bias needs to be addressed by researchers who investigate the effectiveness of other intervention techniques.

2.8 Limitations and Ideas for Future Research

2.8.1 Limitations of Question-Behaviour Effect Interventions

While a broad range of moderators of the question-behaviour effect have been tested, few papers have been published on its limitations. One paper investigating the limitations of the question-behaviour effect focused on whether people would change their behaviour if they knew about the question-behaviour effect (Williams et al., 2004). They hypothesised that people are influenced by question-behaviour effect interventions because they do not see these questions as attempts to influence behaviour. The authors investigated this by asking participants intention questions about flossing their teeth and eating fatty foods and added information as to whether the question was asked by an objective sponsor (e.g. the American Dental Association) or a sponsor that had a self-interest (e.g. The Association of Dental Products Manufacturers). They found that people were more likely to floss and less likely to eat fatty foods when the questions were labelled with an objective sponsor name in comparison to a self-interest sponsor name.

This finding is interesting as it shows that when participants are assuming the questions are asked to influence their behaviour, they are less likely to comply. In a follow up study, the authors found that cognitive resources moderated this effect. If participants' cognitive resources were restrained, they were not able to use the labelling to deduce the goal of the questions they were asked. This resulted in the same changes in behaviour as the conditions that did not receive any labelling of the questions.

While these results seem trivial, it is interesting that people are influenced by being asked intention questions when they believe they are taking part in research, but not when they are aware of the source of the questions. These findings are especially important as other research using satisfaction surveys of a car manufacturer found these surveys influenced future purchasing behaviour (Morwitz et al., 1993). It could be that the participants in that

study were not aware of the source of the questionnaire, as they were part of a consumer panel, or that the question-behaviour effects would have been larger if the questionnaires were distributed by another party.

2.8.2 Gaps in the Literature

Based on this literature review, three gaps in the question-behaviour effect literature can be identified. The first gap is a lack of systematic analysis of the question-behaviour effect. So far, three meta-analyses have been conducted, but they are either out-dated (Spangenberg & Greenwald, 1999) or focus on a subdomain of the question-behaviour effect instead of all studies in this area (Rodrigues et al., 2014; Sprott, Spangenberg, Knuff, et al., 2006). Especially since some recent studies failed to replicate the basic question-behaviour effect finding that asking questions about behaviour influences subsequent behaviour, it is necessary to analyse the findings thus far in a meta-analytic setting. A meta-analysis could not only be used to test the hypothesis that asking questions about behaviour influences subsequent behaviour, but also investigate the role of other factors such as setting (e.g. lab or field setting), type of question (intentions, attitudes or predictions) and measurement of outcome variable (self-reported or an objective measurement of behaviour).

The second gap in the research is that, if asking questions influences behaviour, there is no consensus about why this effect occurs. The two dominant explanations are attitude activation (e.g. Morwitz & Fitzsimons, 2004) and cognitive dissonance (e.g. Spangenberg et al., 2003). While further research by Spangenberg and colleagues (Spangenberg et al., 2012) suggests that cognitive dissonance is at play, more experimental research in this area is needed to investigate possible alternative explanations.

The third and final gap in the research of the question-behaviour effect thus far, is that it is investigated in isolated settings. While some researchers have investigated the

effectiveness of a question-behaviour effect intervention compared to other techniques such as implementation intentions (e.g. Godin et al., 2010, 2014), more research into adding other techniques to a question-behaviour effect intervention is needed to validate the use of question-behaviour effect interventions to induce meaningful changes in behaviour and to investigate which factors influence its effectiveness as social influence technique.

These three gaps lead to three research questions: "What is the overall effect of question-behaviour effect interventions?", "What is the underlying mechanism that drives the question-behaviour effect?", and "What other factors might moderate the question-behaviour effect?"

The chapters that follow focus on addressing these three questions. In the next chapter, a conducted meta-analysis of the question-behaviour effect will be discussed that focuses on the overall effect of question-behaviour effect interventions and identifying moderating characteristics of the question-behaviour effect. The meta-analysis is followed by a series of empirical studies investigating the second research question regarding identifying the underlying mechanisms of the question-behaviour effect (behavioural questionnaire and Studies 1-4). The last set of chapters (Studies 5-7) focus on the moderating role of self-affirmation and difficulty of the focal behaviour. Findings, implications and suggestions for further research are discussed in the general discussion chapter that concludes this thesis.

CHAPTER 3

META-ANALYSIS

3.1 Introduction

As discussed in the literature review, the question-behaviour effect has been studied using different methods with different labels. The name for this effect has varied over the years from s*elf erasing nature of errors of prediction* (S. J. Sherman, 1980) to the *self-prophecy effect* (e.g. Spangenberg, 1997; Sprott, Spangenberg, & Perkins, 1999) and the *mere-measurement effect* (e.g. Dholakia & Morwitz, 2002; Morwitz & Fitzsimons, 2004). A decade ago Sprott and colleagues (Sprott, Spangenberg, Block, et al., 2006) proposed "the use of the label *question-behavior effect* to describe any phenomenon whereby questioning of a person (whether it be through an intention measure, self-prediction, a measure of satisfaction, or other means) influences the future performance of the focal behavior" (Sprott et al., 2006, p.129).

3.1.1 Previous Meta-Analyses

In the past, three meta-analyses on the question-behaviour effect have been conducted. One meta-analysis included all studies published until 1999 (Spangenberg & Greenwald, 1999). This meta-analysis consisted of 11 studies and found an effect size, converted to Cohen's d, of $d = 0.26$. A second meta-analysis focused on self-prophecy studies related to health behaviour and consisted of seven studies (Sprott, Spangenberg, Knuff, & Devezer, 2006). The authors found an effect size, converted to Cohen's d, of $d = 0.54$. Recently, a meta-analysis of the question-behaviour effect related to health behaviour included 33 studies and found an effect size of $d = 0.09$ (Rodrigues, O'Brien, French, Glidewell, & Sniehotta, 2014). Apart from these efforts to combine the results of multiple question-behaviour effect

studies, no recent effort has been made to conduct a general meta-analysis of the question-behaviour effect since the phenomenon was first investigated in 1980.[2]

3.1.2 The Present Study

The goal of the present study is to investigate the effectiveness of the question-behaviour effect as a social influence technique through the use of meta-analysis. The aim of this meta-analysis is threefold: the first aim is to calculate the updated overall effect size since the 1999 meta-analysis (Spangenberg & Greenwald, 1999) to see whether the effect is robust. In addition to this, second aim is to test whether two methodological factors, publication bias and social desirability bias, can be ruled out as the causes of this effect. Finally, since the meta-analyses by Sprott and colleagues (2006) and Rodrigues and colleagues (2014) found different effects while focusing on health behaviours and differed in types of intervention questions, the third aim is to investigate the applicability and universality of the question-behaviour effect as a social influence technique through moderator analyses of the type of intervention question, intervention setting, time interval between intervention and behavioural measurement, and the type of focal behaviour.

The meta-analysis focuses on experimental studies with random allocation of participants in which an intervention to change behaviour included a condition where attitude, future behaviour prediction and/or intention questions were asked as means to change behaviour. Studies were required to have a behavioural measurement as dependent variable in order to be eligible for inclusion in this meta-analysis. In terms of type of intervention questions, the present study includes a wider variety of studies compared to the earlier meta-analyses on the self prophecy effect where only predictions about future

[2] Since completing the literature review and meta-analysis, another meta-analysis on the question-behaviour effect has been published by Wood et al. (2015). That meta-analysis is discussed in Chapter 8: Literature Update.

behaviour were included (Spangenberg & Greenwald, 1999; Sprott, Spangenberg, Knuff, et al., 2006) and narrower compared to the recent meta-analysis on health behaviours (Rodrigues et al., 2014) that extended the inclusion criteria by also including studies that measured cognitions and/or past behaviour as intervention, or used motivational interviewing as an intervention method.

3.1.3 Moderator Analyses

In addition to calculating the updated overall effect, moderator analysis are used to investigate whether the effect can be explained by a methodological error such as social desirable responding and to investigate the applicability and universality of the effect.

In the present study five moderators are identified for investigation: 1) the type of outcome measurement; 2) the type of intervention question; 3) the intervention setting; 4) the time interval between intervention and behaviour measurement and 5) the type of focal behaviour.

Investigating the type of outcome measurement can provide insight into the underlying mechanism of the question-behaviour effect. The dependent variable used in the included studies included is either a self-reported or objective behaviour measurement. Comparing these two types of dependent variable can identify the influence of a possible social desirability bias (Fisher, 1993) on the outcomes of question-behaviour effect interventions. If social desirability underlies the question-behaviour effect, this should result in significantly larger effect sizes in studies using self-reported measurements compared to studies that use objective behaviour measurements.

To investigate the applicability and universality of the question-behaviour effect as a social influence technique, four moderators are investigated: type of intervention question, intervention setting, time interval between the intervention and behavioural measurement and

type of focal behaviour.

The studies included in this meta-analysis differ in terms of type of questions asked during the intervention. Studies used attitude, intention and/or future behaviour prediction questions as a question-behaviour effect intervention. These different types of questions are investigated to see whether or not all of these questions can result in a change of behaviour.

Investigating the intervention setting is important to expand the understanding of whether personal contact is a requirement for the technique to be successful. To investigate this, settings with more personal contact between the experimenter and the participant (i.e. lab experiments and telephone surveys) are compared with settings with less personal contact between the experimenter and participant (i.e. paper and pencil studies and web studies). Because of the way lab studies are designed, an increased effect size is hypothesized in those studies, compared to other intervention settings regardless of a possible need for personal contact. If personal contact is a requirement for the effect to occur, the effect sizes of paper and pencil and web studies should be close to zero and non-significant. If an effect does occur under those circumstances, this increases the applicability of the technique as successful social influence strategy since costs for designing and distributing such an intervention are relatively low.

The time interval between the intervention and behaviour measurement is included as a moderator to investigate to what extend the question-behaviour effect can be used to change behaviour in the long run. It is expected that studies in which behaviours are measured over a greater period of time will still show a significant effect, albeit a smaller effect than studies using a shorter time interval.

The final included moderator is the type of focal behaviour. Since question-behaviour effect studies focus on a great diversity of behaviours (22 different behaviours were investigated in the 55 comparisons in this meta-analysis) comparing specific behaviours is

difficult. However, these different behaviours can be coded into one of four categories: commercial, compliance, pro-self and pro-others. Commercial behaviour relates to purchasing behaviours. Compliance behaviour relates to studies in which the outcome variable is compliance to a request. The pro-self and pro-other studies relate to who benefits from the change in behaviour. In pro-self studies, participants themselves benefit from a change in behaviour, such as is the case in healthy nutrition studies or health club attendance studies. In studies categorized as "pro-others", a change in the focal behaviour is mainly beneficial to other people or society in general, as is the case in blood donation and recycling studies. Comparing the effect sizes of these subgroups is important to investigate the universality of the question-behaviour effect as social influence technique. It might be that some behaviours are influenced to a greater extend than others. This will help researchers decide whether or not to use the question-behaviour effect as a behaviour change technique when designing interventions in the future and might explain the difference in findings in earlier meta-analysis on the question-behaviour effect.

3.2 Method

3.2.1 Search Criteria

First, all the relevant question-behaviour effect studies were collected. PsychINFO and the university's search engine, which includes the important psychology and marketing databases, such as Science Direct and JSTOR, were used since most question-behaviour effect studies have been published in these areas. The following terms were used in this literature search: question-behavior/our effect, mere-measurement effect, self-prophecy effect and self-erasing errors of prediction. Furthermore, a request for papers was made on the Psych-Postgrads listserv and the reference lists of all found studies related to the question-behaviour effect were examined to find additional studies. The search was limited to

publications from 1980, when the first paper on the question-behaviour effect was published, up to July 2014. All found studies were written in English, so language was not considered to be an issue.

3.2.2 Inclusion and Exclusion Criteria

Studies were coded for eligibility and relevant moderators. Whenever there was reason to doubt the eligibility of the study as a whole or there were doubts about which specific conditions to include, these issues were discussed with a second coder. A final decision was based on agreement after this discussion.

The following criteria were applied to determine whether or not a study was to be included: the study had to have an experimental design with random allocation of participants to the different conditions. There should be at least one intervention group in which only a question-behaviour effect intervention was offered and at least one control group that did not receive an intervention. The dependent variable needed to be a behaviour measurement, which could either be a self-reported or an objective behaviour measurement. The statistical information that was required to calculate the effect size and weighing needed to be available in order for the study to be included in the meta-analysis. If the required information was not found in the paper, the first author of the paper was contacted with a request for the missing information. If, for whatever reason (e.g. lost data), the author did not provide the required information, the study was dropped from the sample. Authors who did not reply within a reasonable time frame were contacted a second time. After contacting those authors a second time, all authors responded to the requests for additional information.

3.2.3 Coding of the Moderators

The coding of the moderators was based on the following steps: For intervention

questions, studies were coded based on the wording in the study's description of the intervention question. If the study used "predict", "likelihood", "will/would [you]" or "expect", the intervention was coded as a "future behaviour prediction question". If the study used "intent" or "intention", the intervention was coded as an "intention question." If at least one attitude question was asked without asking any intention or future behaviour prediction question, the intervention was coded as "attitude question." When the intervention consisted of at least one attitude and one intention question, this was coded as "attitude and intention questions."

For intervention setting, the study was coded as "lab study" if the intervention required participants to come to a lab to take part in the study. Studies were coded as "web studies" if the intervention was distributed online. If the intervention questions were asked by calling the participant, this was coded as "telephone survey." If the intervention consisted of filling in a printed questionnaire outside the lab, this was coded as "paper and pencil study." This category consists of studies using classroom settings as well as questionnaires sent by mail. One study used a personal visit from the experimenter as setting and was coded accordingly.

The study was considered to use a "self-reported behaviour measurement" if participants were asked how many times they had performed the focal behaviour in a given time frame. If the study used an objective behaviour measurement, this was coded as "objective behaviour measurement."

Time interval was coded into four different categories: one hour, one week, three months and one year. Coding time interval as a categorical instead of a continuous variable was the result of papers' imprecise description of time intervals. Studies were coded as "one hour" if the dependent variable was measured less than one hour after the intervention. Studies measuring the focal behaviour less than one week, but more than one hour, after the intervention were coded as "one week" and studies were coded as "three months" or "one

year" if the behaviour measurement took place between one week and three months, and three months and one year after the intervention respectively.

In terms of type of focal behaviour, studies were coded as "compliance" if the outcome measurement consisted of positively responding to a request from the experimenter (e.g. request to mail envelopes on specific days (Chapman, 2001) or a request to sing the Star-Spangled Banner over the telephone (S. J. Sherman, 1980). Studies focusing on participants buying a product were coded as "commercial." Studies were coded as "pro-self" if the participant was the main beneficiary of the change in behaviour, as is the case in behaviours such as signing up for a health check for example. Studies in which the main beneficiary was either someone else (altruistic behaviour) or where the behaviour benefits society as a whole (e.g. recycling behaviour) were coded as "pro-others." The moderators were single coded. When the coder was unsure about how to code a certain moderator, these cases were discussed with a second coder. A final decision was based on agreement after this discussion.

3.2.4 Statistical Analysis

As stated, there were three objectives in analysing the meta-data. The first objective was to investigate the overall effect to see how effective the question-behaviour effect is as tool to change behaviour. The second objective was to investigate a possible publication bias and social desirability bias, which is helpful in understanding the validity of the overall effect. The third objective was to conduct moderator analyses to determine the applicability and universality of the question-behaviour effect as social influence tool.

Investigating the overall effect.

Since there is a wide variety in outcome measures (different behaviours/scales) and the type of measurement (dichotomous/continuous) also differs across the included studies, Cohen's *d* was used as effect size measure and its inverse variance as weighing factor as

described by Borenstein, Hedges, Higgins and Rothstein (2009). The inverse variance of studies was used as weighing factor because this allowed for studies that have estimated an effect size with greater precision to be considered more important in comparison to studies where the effect sizes were less precisely estimated. The more precise the estimate of the effect size is, the smaller the variance in the data. So using the inverse of the variance resulted in studies with more precise effect size estimates to have more impact. To calculate the effect sizes and inverse variances, the formulas described by Borenstein et al. (2009) were used. For the studies with a continuous outcome variable, the effect size and inverse variance were calculated using the means, standard deviations and group sizes (Formula 1 and 2). For the studies with a dichotomous (yes/no) outcome, the log odds ratio and variance were calculated first (Formula 3 and 4) and transformed these into Cohen's *d* effect sizes and variances (Formula 5 and 6). In studies where a decrease in behaviour should be considered a positive outcome (e.g. reducing eating fatty foods (Levav & Fitzsimons, 2006) and reducing drinking behaviour (Todd & Mullan, 2011), the calculated effect size was multiplied by -1 so that for those studies, a decrease in behaviour would lead to a positive effect size.

Formula 1

$$d = \frac{M_{Intervention} - M_{Control}}{\sqrt{\frac{(n_{Intervention} - 1) * SD^2_{Intervention} + (n_{Control} - 1) * SD^2_{Control}}{n_{Intervention} + n_{Control} - 2}}}$$

Formula 2

$$V_d = \left(\frac{n_{Intervention} + n_{Control}}{n_{Intervention} * n_{Control}}\right) + \frac{d^2}{2 * (n_{Intervention} + n_{Control})}$$

Formula 3

$$LogOddsRatio = \ln\left(\frac{Yes_{Intervention} * No_{Control}}{No_{Intervention} * Yes_{Control}}\right)$$

Formula 4

$$V_{LogOddsRatio} = \frac{1}{Yes_{Intervention}} + \frac{1}{No_{Intervention}} + \frac{1}{Yes_{Control}} + \frac{1}{No_{Control}}$$

Formula 5

$$d = LogOddsRatio * \frac{\sqrt{3}}{\pi}$$

Formula 6

$$V_d = V_{LogOddsRatio} * \frac{3}{\pi^2}$$

If a study included more than one effect size because of multiple conditions, for example when a study consisted of one control condition and two different intervention conditions, each experimental condition was added as a separate comparison, where the effect size was calculated by using the same control condition for both experimental conditions. In the case of multiple measurements of the focal behaviour at different time points, the first outcome measurement was used to calculate the effect size.

Random versus fixed effects model.

There are several different models that can be used in meta-analytic research, most importantly the random effects model and the fixed effects model (Borenstein et al., 2009). The difference between these models is that the fixed effect model assumes that all studies in the meta-analysis are estimations of the same effect size and use the same methods, measurements, target population and procedures. So if multiple researchers would all ask a prediction question regarding the same behaviour to a group of students and use the same measurements to investigate its effects on subsequent behaviour, a fixed effects model could be used. However, as discussed in the literature review, the different studies show a wide variety in use of methods, target population, focal behaviour and ways of measuring the outcome variable.

In contrast with the fixed effects model, a random effects model allows for these differences between studies and assumes the researchers want to investigate an underlying theme, in this case, the question-behaviour effect. Since the studies in the area of the question-behaviour effect vary widely in terms of study characteristics, a random effects model was assumed and during the analysis, a Q-test was performed to investigate whether this decision is justified by the data.

The data were analysed using the metafor-package in R (Viechtbauer, 2010) with standardized mean difference as measure and the calculated Cohen's *d* values and inverse variances as effect sizes and weighing factors respectively. The multcomp-package (Hothorn, Bretz, & Westfall, 2008) was used to analyse the moderator contrasts.

Publication bias.

The possible influence of a publication bias on the outcomes of this meta-analysis is investigated through a trim and fill analysis (Duval & Tweedie, 2000a, 2000b) by using the metaphor-package in R (Viechtbauer, 2010). This method estimates the number of missing (unpublished) studies based on the asymmetry in the funnel plot of the included studies. It then includes these studies to estimate the unbiased effect size. This estimation is not to be seen as a more valid estimation of the effect, but as a way to investigate a possible publication bias (Viechtbauer, 2010).

3.3 Results

3.3.1 Study Selection

The database search identified 190 records. After duplicates were removed, 181 records remained. These records were screened on relevance by title and abstract, reducing the number of eligible results to 39 papers. An additional 36 papers were identified by examination of the reference lists of the eligible results. Personal contact with an author of

one of those papers resulted in one additional paper. The message on the Psych-Postgrads listserv did not result in any additional papers. In total, 76 papers consisting of 147 studies that empirically investigated the question-behaviour effect were identified.

Of these 147 studies, 100 studies did not meet the set criteria - 16 studies were omitted because the study did not have an experimental design with random allocation of participants to the different conditions and 26 studies were omitted because the dependent variable was not a behaviour measurement. A further 41 studies were omitted because the independent experimental condition did not (only) consist of attitude, future behaviour prediction and/or intention questions (e.g. studies asking participants about the frequency of behaviours in a population, or studies using a motivational interview as intervention) and 10 studies were omitted because there was no real control group. Lastly, seven studies were omitted because the required statistical information was not available. See Figure 1 for a schematic overview of the selection process. The remaining 47 studies, consisting of 55 comparisons, were coded for moderators (see Table 1).

3.3.2 Overall Effect

The remaining 55 comparisons were used to conduct a meta-analysis by applying a random effects model on the data. A random-effects model was used as the included studies varied in their methods and goals and a Q-test supported this decision, since there was considerable heterogeneity in the true effect sizes, Q (54) = 384.41, $p < .0001$. The overall effect is $d = 0.26$, 95%CI [0.18, 0.34] (see Figure 2). In accordance with Cohen's reference points for effect sizes (small: $d = 0.2$, medium $d = 0.5$, large $d = 0.8$ (Cohen, 1988), this is to be considered a small effect.

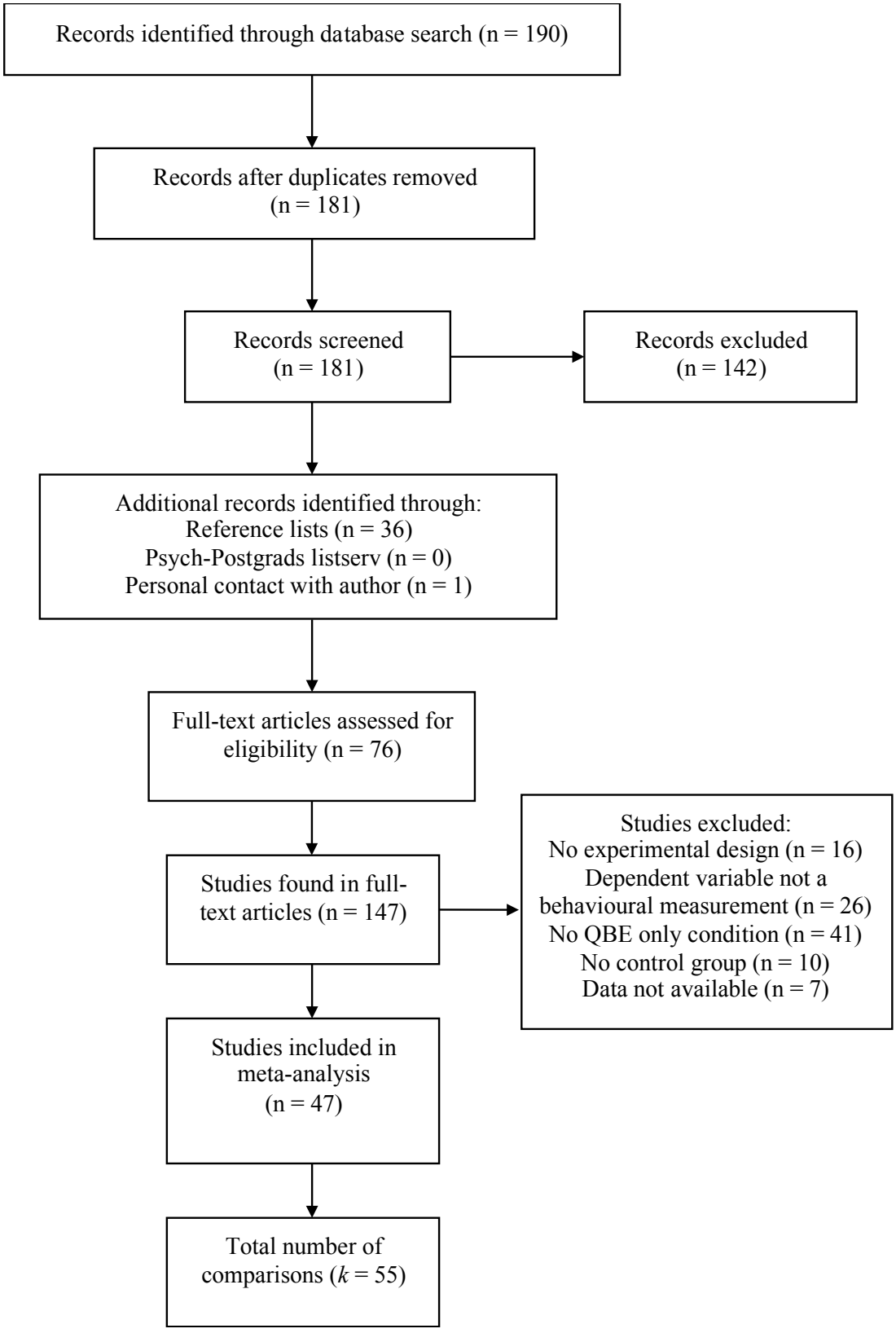

Figure 1. Flow chart of study selection process.

Table 1. Overview of the studies included in the meta-analysis and moderator coding.

Authors	Year	Study	N	Intervention question	Intervention Setting	Behavioural Measurement	Time interval	Type of focal behaviour
Sherman	1980	Study 1	36	Prediction	Personal visit	Objective measurement	3 Months	Compliance
Sherman	1980	Study 2	52	Prediction	Telephone survey	Objective measurement	Week	Compliance
Sherman	1980	Study 3	92	Prediction	Telephone survey	Objective measurement	Week	Pro-others
Greenwald et al.	1987	Study 1	62	Prediction	Telephone survey	Objective measurement	Week	Pro-others
Greenwald et al.	1987	Study 2	60	Prediction	Telephone survey	Objective measurement	Week	Pro-others
Greenwald et al.	1988	Study 1	627	Prediction	Telephone survey	Objective measurement	Week	Pro-others
Greenwald et al.	1988	Study 2	234	Prediction	Telephone survey	Objective measurement	Week	Pro-others
Greenwald et al.	1988	Study 2	225	Prediction	Telephone survey	Objective measurement	Week	Pro-others
Spangenberg & Obermiller	1996	Study 1	81	Prediction	Paper and pencil survey	Objective measurement	Week	Pro-self
Spangenberg	1997	Study 1	142	Prediction	Telephone survey	Objective measurement	3 Months	Pro-self
Cioffi and Gardner	1998	Study 1	488	Intention	Web study	Objective measurement	Week	Pro-others
Sprott et al.	1999	Study 1	14	Prediction	Paper and pencil survey	Objective measurement	3 Months	Pro-others
Sprott et al.	1999	Study 2	126	Prediction	Paper and pencil survey	Self-reported behaviour	Year	Pro-others
Obermiller & Spangenberg	2000	Study 1	207	Prediction	Telephone survey	Objective measurement	3 Months	Pro-others
Chapman	2001	Study 2	416	Attitude	Paper and pencil survey	Objective measurement	Week	Compliance
Chapman	2001	Study 2	399	Attitude	Paper and pencil survey	Objective measurement	Week	Compliance
Chapman	2001	Study 2	469	Intention	Paper and pencil survey	Objective measurement	Week	Compliance
Chapman	2001	Study 2	436	Intention	Paper and pencil survey	Objective measurement	Week	Compliance
Dholakia & Morwitz	2002	Study 1	2009	Attitude	Telephone survey	Objective measurement	Year	Commercial
Smith et al.	2003	Study 1	588	Prediction	Telephone survey	Objective measurement	Week	Pro-others
Smith et al.	2003	Study 1	559	Prediction	Telephone survey	Objective measurement	Week	Pro-others
Spangenberg et al.	2003	Study 2	1107	Prediction	Telephone survey	Objective measurement	3 Months	Pro-self
Spangenberg et al.	2003	Study 5	61	Prediction	Web study	Objective measurement	Hour	Pro-others
Sprott et al.	2003	Study 2	137	Prediction	Lab experiment	Objective measurement	Hour	Pro-self
Chandon et al.	2004	Study 1	391	Intention	Telephone survey	Objective measurement	3 Months	Commercial

Sprott et al.	2004	Study 1	243	Prediction	Paper and pencil survey	Objective measurement	Hour	Pro-self
Sprott et al.	2004	Study 2	120	Prediction	Paper and pencil survey	Objective measurement	Hour	Pro-self
Sprott et al.	2004	Study 2	121	Prediction	Paper and pencil survey	Objective measurement	Hour	Pro-self
Williams et al.	2004	Study 3	191	Prediction	Lab experiment	Objective measurement	Hour	Pro-self
Williams et al.	2004	Study 4	70	Prediction	Lab experiment	Objective measurement	Hour	Pro-others
Levav & Fitzsimons	2006	Study 1	97	Prediction	Paper and pencil survey	Self-reported behaviour	3 Months	Pro-self
Levav & Fitzsimons	2006	Study 2	48	Prediction	Lab experiment	Objective measurement	Hour	Pro-self
Spangenberg & Sprott	2006	Study 1	123	Prediction	Lab experiment	Objective measurement	Hour	Pro-self
Spangenberg & Sprott	2006	Study 2	86	Prediction	Lab experiment	Objective measurement	Hour	Pro-others
Borle et al.	2007	Study 1	5000	Attitude	Telephone survey	Objective measurement	Year	Commercial
Fitzsimons et al.	2007	Study 1	81	Prediction	Paper and pencil survey	Objective measurement	Year	Pro-self
Janiszewski & Chandon	2007	Study 4	64	Prediction	Lab experiment	Objective measurement	Hour	Commercial
Godin et al.	2008	Study 1	4672	Attitude + Intention	Paper and pencil survey	Objective measurement	Year	Pro-others
Sandberg & Conner	2009	Study 1	2748	Attitude + Intention	Paper and pencil survey	Objective measurement	Year	Pro-self
Spence et al.	2009	Study 1	31	Intention	Paper and pencil survey	Self-reported behaviour	Week	Pro-self
Spence et al.	2009	Study 1	32	Intention	Paper and pencil survey	Self-reported behaviour	Week	Pro-self
Van Kerckhove et al.	2009	Study 1	152	Prediction	Web study	Objective measurement	3 Months	Pro-self
Godin et al.	2010	Study 1	1753	Intention	Paper and pencil survey	Objective measurement	Year	Pro-others
Chandon et al.	2011	Study 3b	1179	Prediction	Paper and pencil survey	Objective measurement	Year	Pro-self
Conner et al.	2011	Study 1	384	Attitude + Intention	Paper and pencil survey	Objective measurement	Year	Pro-self
Conner et al.	2011	Study 2	1200	Attitude + Intention	Paper and pencil survey	Objective measurement	3 Months	Pro-self
Godin et al.	2011	Study 1	374	Attitude + Intention	Telephone survey	Self-reported behaviour	3 Months	Pro-self
Todd & Mullan	2011	Study 1	78	Attitude + Intention	Web study	Self-reported behaviour	3 Months	Pro-self
Van Kerckhove	2012	Study 2a	88	Attitude	Lab experiment	Objective measurement	Hour	Commercial
Van Kerckhove	2012	Study 2a	87	Prediction	Lab experiment	Objective measurement	Hour	Commercial
Ayres et al.	2013	Study 1	146	Attitude + Intention	Web study	Objective measurement	Hour	Pro-self
Van Dongen et al.	2013	Study 1	7008	Attitude + Intention	Paper and pencil survey	Objective measurement	Year	Pro-others
Van Dongen et al.	2013	Study 2	11789	Attitude + Intention	Paper and pencil survey	Objective measurement	Year	Pro-others
Godin et al.	2014	Study 1	2000	Intention	Paper and pencil survey	Objective measurement	Year	Pro-others
Wood et al.	2014	Study 1	125	Intention	Lab experiment	Objective measurement	Hour	Pro-self

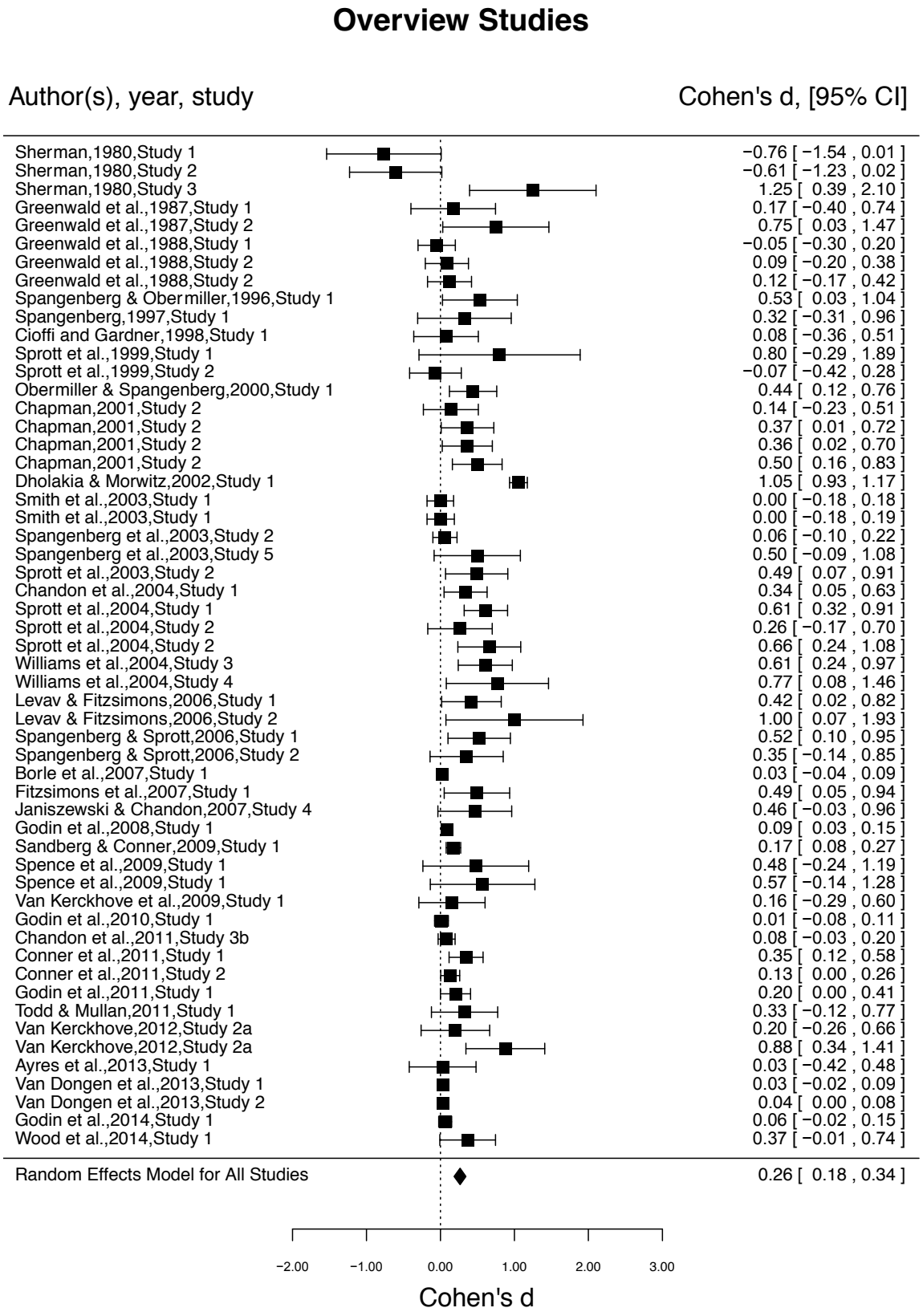

Figure 2. A forest plot of all the included studies (k=55) with name of the author(s), year of publication and the study number. The squares represent the effect size (Cohen's d) and the lines represent the 95% confidence intervals.

3.3.3 Publication Bias

A trim and fill analysis was conducted to investigate a possible publication bias in the results. The analysis estimated that an additional 19 studies are missing on the left side of funnel plot (See Figure 3 and 4). If those estimated 19 studies were in fact conduced and would have been included, the overall effect size drops from $d = 0.26$, 95%CI [0.18, 0.34] to $d = 0.11$, 95%CI [0.01, 0.21].

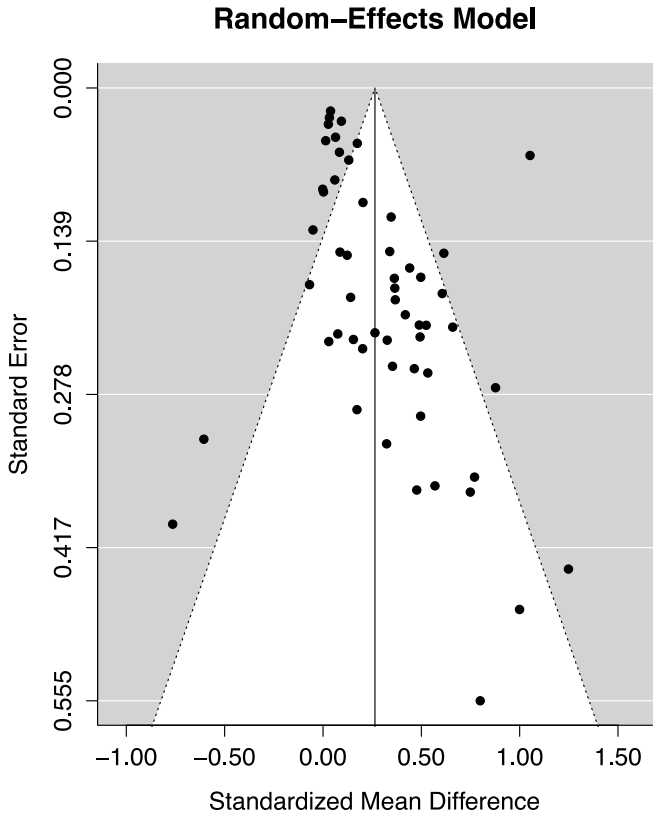

Figure 3. Funnel plot of the studies included in the meta-analysis.

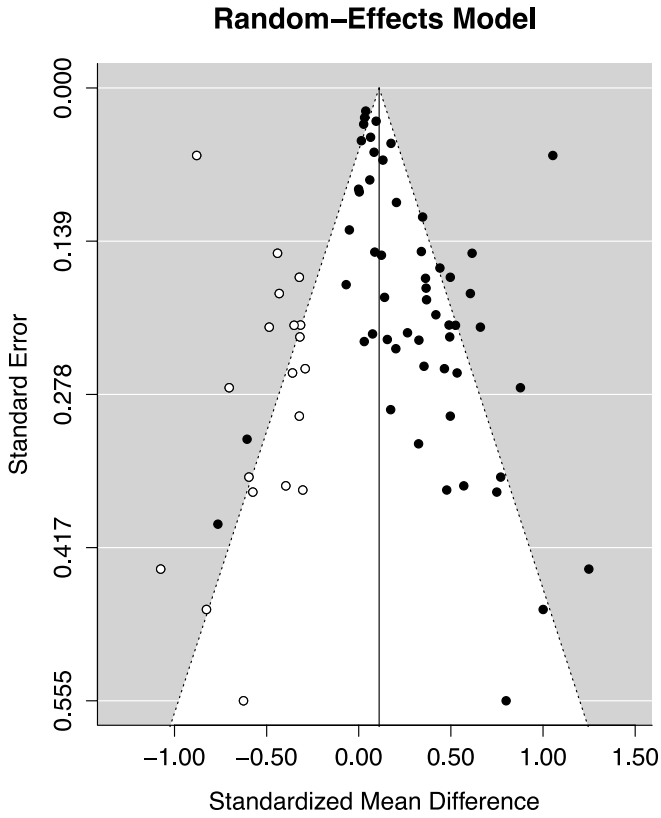

Figure 4. Funnel plot of the studies included in the meta-analysis with the addition of the 19 additional studies estimated by the trim and fill analysis.

3.3.4 Social Desirability Bias

A moderator analysis of the type of outcome measurement showed small effects for both objective outcome measurements, $k = 49$, $d = 0.26$, 95% CI [0.18, 0.35], as well as self-reported outcome measurements, $k = 6$, $d = 0.27$, 95% CI [0.01, 0.53]. The test of moderators showed no significant difference between the subgroups, Q (1) = 0.00, $p = .98$.

3.3.5 Applicability and Universality of the Question-Behaviour Effect

To investigate the applicability and universality of the question-behaviour effect, four moderator analyses were conducted: type of intervention question, intervention setting, time interval and type of focal behaviour.

Type of intervention question.

Moderator analysis showed that asking attitude questions (k = 5) had a small to medium effect, d = 0.39, 95% CI [0.15, 0.63], and that asking intention questions (k = 9) had a small effect, d = 0.26, 95% CI [0.06, 0.45]) Asking participants to predict their future behaviour (k = 32) also produced a small effect, d = 0.29, 95% CI [0.18, 0.40], while asking both attitude and intention questions (k = 9) produced a small, non-significant, effect, d = 0.14, 95% CI [-0.02, 0.31]. The test of moderators showed no significant difference between the subgroups, Q (3) = 3.30, p = .35.

Intervention Setting.

Moderator analysis showed a medium effect for studies carried out in the lab, k = 10, d = 0.52, 95% CI [0.31, 0.73]. The analysis also showed small effect for interventions administered through telephone surveys, k = 16, d = 0.22, 95% CI [0.09, 0.36], and through paper and pencil surveys, k = 23, d = 0.24, 95% CI [0.13, 0.35]. Administering the intervention online (k = 5) did not show a significant effect, d = 0.20, 95% CI [-0.09, 0.49]. One study used a personal visit as intervention method and showed a non-significant effect, d = -0.76, 95% CI [-1.66, 0.13]. Since this subgroup only consisted of one study, the subgroup was excluded from further analysis. The test of moderators showed a marginally significant difference between the subgroups, Q (3) = 6.52, p = .09.

Time interval between intervention and behaviour measurement.

Studies with a behaviour measurement within an hour after the intervention (k = 15) showed a medium effect, d = 0.49, 95% CI [0.32, 0.65], while studies in which the focal

behaviour was measured within a week after the intervention (k = 17) showed a small effect, d = 0.20, 95% CI [0.06, 0.35]. Small effects were also found in studies where the behaviour was measured up to three months after the intervention, k = 11, d = 0.22, 95% CI [0.04, 0.39], and studies in which the behaviour was measured up to a year after the intervention, k = 12, d = 0.19, 95% CI [0.05, 0.32]. The test of moderators showed a significant difference between the subgroups, Q (3) = 9.25, p = .03. Contrasts showed a significant larger effect size for studies where the focal behaviour was measured within an hour after the intervention compared to studies in which the time interval was up to a week ($d_{difference}$ = 0.28, p = .01), up to three months ($d_{difference}$ = 0.27, p = .03) and up to a year ($d_{difference}$ = 0.30, p = .007)

Focal behaviour.

Studies focusing on compliance (k = 6) showed a non-significant effect, d = 0.16, 95% CI [-0.09, 0.40], while studies with a commercial focal behaviour (k = 6) showed a medium effect, d = 0.48, 95% CI [0.27, 0.70]. Studies related to "pro-self" behaviour (k = 23) showed a small effect size, d = 0.33, 95% CI [0.21, 0.44], as did studies related to "pro-others" behaviour, k = 20, d = 0.14, 95% CI [0.02, 0.26]. The test of moderators showed a significant difference between the subgroups, Q (3) = 10.19, p = .02. Contrasts showed a significant larger effect size for studies with a commercial type of focal behaviour compared to a pro-others type of focal behaviour ($d_{difference}$ = 0.34, p = .008). Contrasts also showed a significant larger effect size for studies with a pro-self type of focal behaviour compared to a pro-others type of focal behaviour ($d_{difference}$ = 0.19, p = .03). See Table 2 for an overview of the moderator analyses.

Table 2. Outcomes of the moderator analyses. k = number of comparisons.

Moderator	**Level**	***k***	**Cohen's *d***	**-95%CI**	**+95%CI**	***p***
Overall effect	All	55	0.2646	0.1846	0.3446	<.0001
Dependent variable	Objective behaviour measurement	49	0.2648	0.1801	0.3495	<.0001
	Self reported behaviour	6	0.2689	0.0055	0.5322	.0454
Intervention questions	Attitudes	5	0.3915	0.1505	0.6325	.0015
	Intentions	9	0.2557	0.0623	0.4491	.0096
	Predictions	32	0.2928	0.1807	0.4048	<.0001
	Intentions and attitudes	9	0.1440	-0.0239	0.3119	.0927
Intervention setting	Lab experiment	10	0.5215	0.3124	0.7306	<.0001
	Telephone survey	16	0.2225	0.0851	0.3599	.0015
	Paper and pencil study	23	0.2392	0.1267	0.3516	<.0001
	Web study	5	0.2007	-0.0876	0.4891	.1724
	Personal visit	1	-0.7643	-1.6564	0.1278	.0931
Time interval	Hour	15	0.4866	0.3219	0.6513	<.0001
	Week	17	0.2042	0.0588	0.3495	.0059
	3 months	11	0.2193	0.0499	0.3937	.0137
	Year	12	0.1855	0.0523	0.3186	.0063
Type of behaviour	Compliance	6	0.1576	-0.0872	0.4023	.2070
	Commercial	6	0.4833	0.2710	0.6956	<.0001
	Pro-self	23	0.3284	0.2122	0.4446	<.0001
	Pro-others	20	0.1401	0.0217	0.2586	.0204

3.4 Discussion

The meta-analysis showed that asking people questions about their attitudes, intentions and/or future behaviour predictions influences future behaviour. In comparison with the meta-analysis carried out by Spangenberg and Greenwald (1999), the overall effect in the present study is similar (d = 0.26 in both meta-analyses). Compared to the meta-analysis on self-prophecy studies to influence health behaviour (Sprott, Spangenberg, Knuff, et al., 2006), the present meta-analysis showed a smaller effect than theirs (d = 0.26 versus d = 0.54). This might be due to the wider variety of focal behaviours included in the present study. Compared to the meta-analysis on the question-behaviour effect regarding health behaviour (Rodrigues et al., 2014) the present meta-analysis showed a larger effect (d = 0.26 versus d = 0.09). This difference might be due to differences in inclusion criteria in the two meta-analyses. The Rodrigues et al. paper included studies that included "assessments of cognitions, behaviour, or cognitions and behaviour by questionnaire (paper and pencil or online) or interview" (Rodrigues et al., 2014, p.2), while the present meta-analysis focused on studies measuring attitudes, future behaviour predictions and/or intentions. Calculating the overall effect of the studies that were included in both the health behaviour study and the present study, i.e. studies that meet the inclusion criteria of both studies, (k = 20) resulted in an effect size of d = 0.21, 95%CI [0.12, 0.30]. Closer inspection of the data reveals that all those studies include an intention or future behaviour prediction question, which suggests that some form of self-prediction might be necessary for a question-behaviour effect intervention to be effective. Clearly, more research is needed to sustain such a claim.

Although the found overall effect in the present study is regarded small (d = 0.26), based on the limited effort it takes to design a question-behaviour effect

intervention, even a small effect is relevant. In situations where a small change in behaviour can be sufficient when the intervention is rolled out on a large scale, for example in the case of attending health checks (e.g. Sandberg & Conner, 2009), the question-behaviour effect can be an efficient way of reaching that goal. Also, since the intervention requires such a small effort, it would be interesting to test what the additive effect is when this technique is used in combination with other behaviour change interventions.

3.4.1 Publication Bias and Social Desirability Bias

The trim and fill analysis showed that the found effect might be somewhat inflated by a publication bias. However, even if the estimated 19 non-published studies exist, the result would be a small, significant effect.

Regarding a possible social desirability bias, the data showed similar effects in studies using self-reported behaviour measurements and objective behaviour measurements ($d = 0.26$ versus $d = 0.27$, $p = .98$). This suggests that the effectiveness of a question-behaviour effect intervention is not caused by a social desirability bias.

3.4.2 Applicability and Universality of the Question-Behaviour Effect

Moderator analysis showed that the three different types of questions (attitudes, intentions, future behaviour predictions) all lead to significant changes in behaviour. Intentions and future behaviour predictions showed small effects, while asking attitudes showed a small to medium effect. Asking both attitude and intention questions does not result in a significant effect, although the 95% confidence interval ([-0.02, 0.31]) suggests that this might be different if there were one or two more studies included in this category. Since the test for moderators was not significant, the

conclusion is that there are no significant differences in effect sizes for different types of intervention questions.

In terms of intervention settings, lab studies showed a medium effect, while telephone surveys, and paper and pencil studies showed a small effect. Web studies did not show a significant effect, which might be due to the small amount of studies (k = 5) that applied this method. As the effect occurs in the lab setting, in telephone surveys and by using paper and pencil surveys and because the significance test for moderators was non-significant, it appears that a personal approach is not required in order to find a meaningful effect. This suggests that a question-behaviour effect intervention can be distributed to a larger population cheaply, as a printed question-behaviour effect questionnaire is sufficient to change future behaviour.

With regards to the time interval between the intervention and the behaviour measurement, a medium effect was found for studies where the time interval was less than one hour and small effects for studies with longer time intervals. Contrast analysis following the significant moderator analysis showed that studies using a time interval of less than an hour result in significantly larger effects. These findings show that while question-behaviour effect interventions are more effective on the short-term, they can also influence behaviour over a longer period of time.

In terms of focal behaviours, the results showed a medium effect for studies focusing on commercial behaviour and small effects for studies focusing on pro-self and pro-others behaviours. Studies focusing on compliance (k = 6) did not show a significant overall effect, which might be explained by looking at the studies included in this category. Two of the six studies showed large negative effects and focused on behaviours that participants might not want to engage in (writing a counter-attitudinal essay and singing the star-spangled banner, S. J. Sherman, 1980, Study 1 and 2). The

intervention might have had the side effect of increasing resistance instead of compliance in these studies, thereby reducing the effect of a question-behaviour effect intervention on compliance. The differences in effect sizes between the different types of focal behaviour were confirmed by a significant test of moderators. Contrast analyses showed that studies focusing on commercial behaviour and on pro-self behaviour result in significantly larger effect sizes than studies focusing on pro-others behaviours. In terms of commercial behaviour, one caveat is the large scale study by Dholakia and Morwitz (2002) which might have driven this effect as they found a large effect size with a small confidence interval (d = 1.05, 95%CI [0.93, 1.17]). Apart from this methodological suggestion, the results of the contrast analysis can be explained in several ways. One explanation is that people might feel a stronger need to act when behaviours are self-relevant. Another explanation is that in the case of commercial behaviour where a product or service is acquired, and in pro-self behaviours, where the participants benefit from changing their behaviour, people can see the result of their change in behaviour more easily. As an example, recycling and donating blood are just causes, but it can more difficult to see the value of the change you personally achieve compared to seeing the effects of signing up for a health check (Conner et al., 2011) or eating less fatty foods (Williams et al., 2004). Finally, it is possible that a feeling of diffusion of responsibility (Darly & Latané, 1968) reduces the urge to act in the case of altruistic behaviours. Further research, in terms of randomized controlled trials that include "pro-self" and "pro-others" behaviours, is needed to investigate the effects of a question-behaviour effect intervention on the different types of behaviour.

3.4.3 Limitations and Suggestions for Further Research

There are a few limitations and methodological implications of the findings. There were few unpublished studies that were eligible for inclusion in this meta-analysis, which might bias the results to some extent. The applied trim and fill analysis indicates that there is a publication bias and including more unpublished studies would benefit the validity of the found effects, especially since the trim and fill analysis cannot be used in the moderator analyses (Viechtbauer, 2010).

Another limitation is that the moderator analyses are based on investigating one moderator at a time. Originally, the goal of the moderator analysis in this study was to include all the moderators instead of investigating only one moderator at a time. However, this was not possible due to a relatively low number of studies and the moderators not being additive. Therefore, an important suggestion for future research is to investigate these moderators experimentally, comparing different moderator factors in one study instead of across studies. This systematic testing of moderators could provide evidence as to whether or not the moderators discussed in the present study are showing meaningful differences in effect size. For example, there might be confounding variables that affect the effect sizes of the type of intervention question.

This meta-analysis is a good first step towards identifying requirements for the question-behaviour effect to occur, but these findings need to be validated by experimental studies that compare the different types of questions, intervention settings, time intervals and focal behaviour. An example can be a study that compares a control group with three intervention groups where each group only ask attitude, intention or future behaviour prediction questions. Some researchers have already taken steps to compare different types of questions (e.g. Chapman, 2001; Godin et al., 2014), but there are many additional questions that could be answered by

experimental investigation of moderators of the question-behaviour effect.

A final limitation is that, apart from ruling out publication bias and social desirability bias as causes of the question-behaviour effect, the meta-analysis could not investigate the underlying mechanisms of the effect. It is therefore still unclear what causes the effect. While significant effects for all three types of intervention questions (attitude, intention and future behaviour prediction) were found, this does not explain what causes the change in behaviour, or that these questions are similar enough to warrant one common underlying mechanism. Further research is needed to identify the underlying mechanisms of these different types of questions.

3.5 Conclusion

In summary, asking people questions about attitudes, intentions and future behaviour predictions influences behaviour, although the effect is small. Publication bias is ruled out as the cause of this effect and moderator analysis suggests that the effect is unrelated to a social desirability bias. In terms of applicability, the moderator analyses suggest that a question-behaviour effect intervention can be easily applied on a large scale, as personal contact is not a requirement for the effect to occur. Analysis of contrasts suggests that in terms of time interval, the question-behaviour effect works better on the short term than the long term. Regarding focal behaviour, contrast analyses suggest that the technique is more effective in changing personal relevant behaviours and commercial behaviours compared to behaviours that mainly benefit other people or society as a whole. Further research is needed to examine both the underlying mechanisms as well as possible moderators of the question-behaviour effect experimentally.

This chapter has covered the first research question of the thesis regarding the

overall effect of question-behaviour effect interventions. The following chapters, covering studies 1-4, will discuss the underlying mechanisms of the question-behaviour effect. But first, there is a need to identify which behaviours can be used as focal behaviour in these studies. Identifying these behaviours is the goal of the behavioural questionnaire discussed in the next chapter.

CHAPTER 4

BEHAVIOURAL QUESTIONNAIRE

4.1 Introduction

As discussed in the literature review and meta-analysis, when investigating the question-behaviour effect empirically, the dependent variable is often some sort of behavioural measurement. As the meta-analysis showed, different types of behaviours result in different effect sizes (e.g. behaviours that the participants benefit from themselves are influenced by a question-behaviour effect intervention to a greater extent than behaviours that benefit others). Therefore, choosing an appropriate focal behaviour when investigating the question-behaviour effect is an important part of the study design. Based on the moderator analysis in the meta-analysis, it seems effective to opt for personally relevant or commercial behaviours, as these have shown significantly larger effect sizes than pro-others or compliance related behaviours. The advantage of choosing a personally relevant behaviour is that participants will be more likely to identify with these behaviours and are more willing to take part in a study investigating these behaviours.

In choosing a focal behaviour, it is key to address behaviours that the participant group in the studies is familiar with, and might have some experience in. Since the empirical work is carried out within a university, a small-scale pilot study investigating students' habits and behaviours would provide insights into which behaviours should be used in the empirical part of this thesis. The goal of the first study, then, is to identify behaviours that can be used as the focal behaviour in later empirical studies in the thesis.

For behaviours to be used as focal behaviour in the later empirical studies, they need to meet two requirements. First, the majority of students need to be familiar with the behaviour, i.e. to have carried out the behaviour at least once. Second, students should not report any floor or ceiling effects for these behaviours before a question-behaviour effect intervention. In other words, there must be room for changing the behaviour. Positive behaviours should have room for increasing the number of students that perform the behaviour or how often they carry out the behaviour, while negative behaviours should have room for decreasing either the number of students performing the behaviour or the intensity of the behaviour. These two requirements will increase the chance of finding a meaningful effect of asking people to predict their future behaviour on subsequent behaviour. To find out which behaviours are suitable, a pilot study was conducted in which a small group of students received a questionnaire about behaviours they might engage in from time to time.

4.1.1 Behaviours Included in the Pilot Study

A by-product of the meta-analysis was a list of behaviours that had been investigated in previous studies. This list served as the basis for the questionnaire in this pilot study. The compiled list of focal behaviours was checked for relevance. Behaviours that were irrelevant for students (e.g. donating money to one's alma mater (Obermiller & Spangenberg, 2000) were dropped from the list. After this step, novel behaviours were added based on early stage research ideas and behaviours that are typically related to student life (e.g. buying bottled water on campus). To finalise the list, it was compared to a set of behaviours used in a study on disclosing personal information (Joinson, Paine, Buchanan, & Reips, 2008). Any behaviour relevant for

students on that list was added to the pilot study. In total, the compiled list consisted of 15 behaviours (See Table 3 for the list of behaviours).

Each behaviour was assessed on how often students were likely to engage in this behaviour, either a chosen amount of times per week, month or year. For example, donating blood is less likely to occur compared to buying bottled water on campus. The timeframe of each behaviour was set so that participants could give a range of answers (e.g. "0 times" to "more than 10 times"), increasing the variety of the provided answers.

Of the total of fifteen behaviours, six behaviours were assessed as "several times a week"; four behaviours were assessed as "several times a month" and five behaviours as "several times a year." Based on this assessment, two questions were formulated based on each behaviour. The first question addressed whether students have ever engaged in the behaviour, while the second question focussed on how often students have engaged in this behaviour in a recent time period that, depending on the focal behaviour, would range from the last week to the last year.

In summary, the present study sets out to identify which behaviours can be used as focal behaviour in later studies by the use of a questionnaire about a range of behaviours, distributed amongst university students.

4.2 Method

4.2.1 Participants

In total, 48 students took part in the pilot study (33.3% male, 66.7% female, M_{age} = 22.83, SD = 2.12). Of those 48 participants, 39 participants completed an online questionnaire while the other 9 completed a pen and paper version of the same questionnaire. All participants were aware that they were not obliged to take part and

that (not) taking part would not influence their marks for the related modules in any way. Participants were also informed that they could withdraw from the study at any time, without having to provide a reason for doing so. The participants who filled in the questionnaire online had to acknowledge that they agreed to take part in the study before they could start filling in the questionnaire. The participants received no reward for taking part in the study. An example information sheet can be found in Appendix I. The study was approved by the Faculty Research Ethics Committee (reference number FBL/14/10/07).

4.2.2 Materials

The pilot study consisted of questions about 15 behaviours. Participants were asked two questions regarding each behaviour: "Have you ever performed this behaviour?" (e.g. "Have you ever been to a health club/gym?") and "If so, how often have you performed this behaviour in the last week/month/year?" where the time interval in the question was changed depending on the focal behaviour of the question (e.g. "If you have been to a health club/gym, how many times have you been to a health club/gym in the last month?"). As a precaution, in addition to "yes" and "no" as answering possibilities to the first question, a "prefer not to say" option was added, to ensure that students would not feel obliged to answer questions they might consider too personal. This option was included in all behaviours so that any personal questions would not stand out from the less personal questions. The percentage of students answering they have engaged in the behaviour as well as the percentage of students answering they prefer not to answer are both important, since a behaviour that a large percentage of students prefers not to disclose information about, is not suitable as focal behaviour in the empirical studies.

The answering possibilities of the second question, related to how often students engaged in the focal behaviour, consisted of a range from "0 times" to "10 times" with the addition of a "more than 10 times" option. The range was shorter for some behaviours if these answering possibilities did not make sense (e.g. the question "how many times have you brought your own lunch to campus in the last week?" had answering possibilities ranging from "0 times" to "5+ times"). In addition to the behaviour questions, some demographic questions were added ("How old are you?" and "What is your gender?") as well as two questions to ensure the participants were part of the (UWE) students' population ("What type of student are you?" [UK, EU, International] and "Which university do you go to?") The questionnaire can be found in Appendix II.

4.2.3 Procedure

Participants were invited to take part in two different ways. In general, module leaders invited their students to take part via a Blackboard announcement on their module pages. In addition to that, participants were invited by the researcher to fill in a printed version of the pilot study questionnaire during tutorials. After an information page that explained what was expected of the students, they were presented with the questions in the behavioural questionnaire. After filling in the questionnaire, they were thanked for their time.

4.3 Results and Discussion

4.3.1 Participant Background

A total of 48 students took part in this pilot study. Of these students, 54.2% (26 of 48) students were international students while 37.5% (18 students) were from

the UK and 8.3% (4 students) were from another country in the European Union (EU). All students were registered as a student at UWE at the time of the data collection.

Table 3. Percentages of participants saying they have engaged in the focal behaviour in the past and means, standard deviations and groups sizes of how often (0-more than 10 times) they have engaged in this behaviour recently (in the last week, month or year). a. This is the mean answer of a slider on how often they have used condoms to practice safe sex [0% - 100%].

	Behaviour	Yes %	Prefer not to say%	Range (number of times)	M	SD	N
Last week							
	Flossing teeth	56.3	6.3	0-7+	3.96	3.89	27
	Buying bottled water on campus	75.0	0.0	0-10+	2.19	2.65	36
	Bringing own lunch to campus	70.8	0.0	0-5+	2.44	2.78	34
	Buying chocolate bars	93.8	0.0	0-10+	1.80	2.63	46
	Walking for more than 30 minutes	95.8	0.0	0-10+	3.34	2.80	47
	Going to bed without brushing your teeth	58.3	0.0	0-7	3.21	2.80	29
Last month							
	Attending a health club	79.2	0.0	0-10+	2.97	4.12	38
	Deliberately missing a class	66.7	6.3	0-10+	2.72	2.40	32
	Using condoms when you have sex with a partner for the first time	77.1	8.3	0-100%	43.04[a]	45.58	25
	Drinking alcohol	87.5	0.0	0-10+	4.47	4.11	43
Last year							
	Donating blood	14.6	0.0	0-5+	2.29	3.90	7
	Making a bet for money	52.1	0.0	0-10+	4.33	4.15	24
	Plagiarising someone else's work	16.7	2.1	0-10+	1.00	1.20	8
	Cheating on a test	33.3	0.0	0-10+	0.94	1.84	16
	Donating money to charity	87.5	0.0	0-10+	4.17	3.51	42

4.3.2 Behaviours

The results of the pilot study can be found in Table 3. In this table, the percentage of students reporting to have engaged in the fifteen different focal behaviours at least once is reported as well as the percentage of students who did not want to answer this question. Also, the means and standard deviations of how often the people who engaged in the behaviour have done so in the recent past are reported.

As Table 3 shows, the vast majority of students have experience with walking for more than 30 minutes (95.8%), buying chocolate bars (93.8%), drinking alcohol (87.5%) and donating money to charity (87.5%).

Weekly behaviours.

All behaviours measured on a timescale of a week were performed by the majority of the students. The promising percentages in this category come from three behaviours: going to bed without brushing your teeth, walking for more than 30 minutes and buying bottled water on campus. These behaviours are promising as in all cases a relatively large group of participants engaged in the behaviour, while the frequency of the behaviour could still be increased.

The finding that more than half of the students go to bed without brushing their teeth almost half of the time is promising, as this shows brushing teeth habits can be vastly increased. Daily exercise is important, and 75% of the students go for walks that last for more than 30 minutes approximately every other day (3.34 walks in the last week on average). This is a relevant base line, as it means that students have experience with this positive behaviour, but can still increase the frequency of carrying out the behaviour. The finding that 75% of the students bought bottled water on campus approximately twice a week can be interpreted in a positive and negative way. The positive interpretation focuses on students drinking enough water to prevent

dehydration and drinking water can be a healthy option compared to fizzy drinks or alcohol. However, it can also be interpreted in a negative way, as buying bottled water is bad for the environment and is more costly than buying a drinking bottle and filling it with tap water. Depending on the focus of the later studies, this behaviour can be investigated from both angles.

The flossing teeth behaviour seems interesting, especially as the numbers are similar to the numbers of students not brushing their teeth before going to bed. In terms of food, the majority brings their own food to campus half of the time (2.44 days on average out of a possible 5 but maybe less days a week) and the majority buys chocolate bars approximately twice a week.

Monthly behaviours.

In terms of behaviours measured on a monthly level, Table 3 shows that the majority of students engage in positive behaviours. For example, nearly four out of every five students attends a health club (79.2%, who, on average, attend almost three times per month). The majority of students also disclose to use a condom when having sex with a partner for the first time (77.1%) and states that they practice safe sex on 43.04% of the occasions. In terms of negative behaviours, two-third of the students reported to have missed classes, with an average of 2.72 missed classes in the last month.

The other behaviour in this category, drinking alcohol, is not selected because the mean number of occasions might be skewed as the data was collected during the holiday season.

Yearly behaviours.

In the yearly behaviours category, donating money to charity is popular, as 87.5% of the students donate money to charity regularly (4.17 times per year). Students also seem to have experience in betting for money, as half of the students bet every few months on average. The other three behaviours that were investigated in the 'last year' category are not very popular amongst students, with percentages of engaging in the behaviour ranging from 14.6 to 33.3%. Given the low scores of how often the students engaged in these behaviours, detecting effects in studies investigating these behaviours empirically would be difficult. Adding time limitations relating to the data collection to the low chance of detecting an effect makes these behaviours unsuitable for the empirical part of this thesis.

4.4 Conclusion

In conclusion, this pilot study suggests several behaviours that would seem suitable as focal behaviours for further empirical studies on the question-behaviour effect. In terms of weekly behaviours, going for walks can be used as a positive behaviour. Going to bed without brushing your teeth can be used as a negative behaviour and buying bottled water on campus might be used for both. While flossing teeth seems an interesting behaviour to investigate, the fact that the majority of the students do not brush their teeth everyday before going to bed indicates that it is probably best to start with this behaviour instead of adding flossing to the brushing teeth ritual.

In terms of monthly behaviours, deliberately missing classes seems a suitable behaviour, as most students have done so on several occasions. This behaviour could

also be classified as a negative behaviour, so the goal would be to reduce rather than increase the occurrence of this behaviour.

In terms of yearly behaviours, none of the behaviours seem suitable for further investigation in the empirical studies in this thesis, as the negative behaviours are performed by only a small part of the students and this group does not perform the behaviour very often.

In summary, four possible focal behaviours emerge from this pilot study: walking for more than 30 minutes, brushing your teeth, buying bottled water and deliberately missing classes. The next chapter will focus on the first two behaviours, walking for more than 30 minutes (Study 1A) and brushing your teeth Study 1B).

CHAPTER 5

STUDY 1: POSITIVE AND NEGATIVE BEHAVIOURS

5.1 Introduction

The meta-analysis showed that the effect of asking questions on behaviour occurs in different settings, focuses on a wide range of behaviours and arises following interventions consisting of different types of questions. Apart from ruling out social desirability and publication bias, the meta-analysis did not provide answers as to why the effect occurs. In the next five chapters, studies investigating the underlying mechanism of the question-behaviour effect are presented. In the current chapter, two studies are described (Study 1A and 1B) that aim to replicate the basic question-behaviour effect for a positive behaviour (Study 1A, going for daily walks) and a negative behaviour (Study 1B, going to bed without brushing your teeth) while also examining two potential underlying mechanisms. The methods of these two studies are based on a earlier paper investigating the underlying mechanism of the question-behaviour effect (Spangenberg et al., 2012). They used a one-session method to investigate the effect, which makes it easier to include larger samples, as students need not be contacted to take part in a follow-up measurement. In their paper, Spangenberg et al. conducted a series of studies to investigate whether cognitive dissonance could be the underlying mechanism of the question-behaviour effect. In one of their reported studies (Study 1) they used recalled past behaviour as an outcome measurement of a question-behaviour effect intervention.

Using this type of outcome variable means this is not a typical question-behaviour effect study, as the outcome measurement is not a measurement of subsequent behaviour, but rather recalled past behaviour. Participants therefore do not

have the opportunity to change their actual behaviour. The disadvantage of this method is that the effects of asking questions on recalled past behaviour might be conceptually different in comparison to the effect on future behaviour. However, the advantage of the method used by Spangenberg et al. is that only one session is required to conduct the study. This reduces the time and effort needed to conduct the study, as well as eliminating drop out issues as participants do not need to be contacted a second time in order to gather all the data.

Spangenberg et al. assigned participants randomly to either a prediction condition or a no-prediction condition that served as control group. The participants in the prediction condition were asked to predict whether or not they would recycle/donate money to charity. One hour later, all participants in both the prediction condition and no-prediction control condition were asked to recall their past behaviour regarding either recycling or donating to charity. Given the timeframe of the study, the participants did not have the opportunity to change their actual behaviour. Therefore, any difference between the prediction condition and the control condition meant a difference in recalled past behaviour. The researchers argued that using this method would give them the opportunity to differentiate between attitude activation and cognitive dissonance as underlying mechanism of the question-behaviour effect. If attitude activation causes the question-behaviour effect, participants who predicted their future behaviour should recall the same amount of past behaviour as the participants in the control condition. If cognitive dissonance drives the effect, participants who predicted their future behaviour would feel dissonance between their prediction and recalled past behaviour. To reduce this dissonance, they would then overestimate their past behaviour. The researchers found that participants who were asked to predict their future behaviour showed an increase

in recalled past behaviour an hour after the making the prediction compared to the control group that was not asked a prediction question. They concluded that the question-behaviour effect is caused by cognitive dissonance.

However, their findings could also be explained from an attitude accessibility (Fazio, Chen, McDonel, & Sherman, 1982; Fazio & Williams, 1986) point of view. When participants are asked to predict their future behaviour and attitudes are activated, they might first need to decide what their attitudes are. To do so, the participants can draw on their past experiences regarding their behaviour. In the case of recycling, they can for example remind themselves of times when they sorted their trash or threw their used batteries in the recycling bin. Based on these past experiences and other activated views, they then decide to predict they will recycle in the future. In turn, when asked to recall past behaviour, they can draw on the memories that have recently been activated and believe they recycled more than they actually did. This may have caused over-reporting of past behaviour compared to a control group that has not had as much time to think about past behaviour. So instead of the experimental group lying and overstating how often they engaged in the behaviour in the past, attitude activation would explain this effect as underreporting past behaviour in the control group or as over reporting past behaviour in the experimental group due to easier access to memories of past behaviour. So it is possible that a form of attitude accessibility caused the increase in recalled past behaviour, instead of cognitive dissonance.

Since Spangenberg et al. (2012) did not objectively measure past behaviour, it is unclear whether the control group provided an accurate estimate of their past behaviour or not. Because of this, it is unclear whether the experimental condition over-reports past behaviour or not and therefore it is unclear whether attitude

activation or cognitive dissonance drives the effect. To use this method to investigate whether cognitive dissonance or attitude activation causes the effect, a focal behaviour is needed that would produce different outcomes depending on what drives the question-behaviour effect; cognitive dissonance or attitude activation. One suitable type of behaviours for this investigation is negative behaviours. If attitude activation drives the effect and causes over-reporting of the focal behaviour, this should result in an increase in recalled past behaviour after letting participants predict whether or not they will engage in a negative behaviour compared to a no-prediction control condition. On the other hand, if cognitive dissonance drives the effect, this should result in participants reducing the dissonance between their prediction and attitude by underreporting their past behaviour.

This hypothesis was tested in Study 1A and 1B. Study 1A tested the basic question-behaviour effect by letting participants predict their future behaviour regarding going for daily walks. Study 1B tested the alternative explanation outlined above by letting participants predict their future behaviour regarding a negative behaviour, going to bed without brushing your teeth. If participants recalled going to bed without brushing their teeth less after predicting their behaviour, this would support the findings of Spangenberg et al. (2012) that cognitive dissonance drives the effect. If the opposite effect were found, this would provide evidence for attitude activation driving the effect. In Study 1A, the hypothesis is that participants who are asked to predict their future walking behaviour will show higher levels of recalled past walking behaviour compared to participants who are not asked to make a prediction. The hypothesis in Study 1B is that participants who are asked to predict their future brushing teeth behaviour will show lower levels of recalling going to bed without brushing their teeth compared to participants who are not asked to make a

prediction, thereby supporting cognitive dissonance as underlying mechanism of the question-behaviour effect.

5.2 Method

5.2.1 Participants

A sample of undergraduate students, $N = 202$, 32.2% male, 67.8% female, $M_{age} = 21.71$, $SD = 3.37$, was asked to fill in a short pen and paper questionnaire in a classroom setting. Students who agreed to take part were assigned randomly to one of four conditions (Study 1A: daily walks prediction, daily walks no-prediction; Study 1B: brushing teeth prediction, brushing teeth no-prediction). They received a questionnaire with an information sheet that explained that the researcher was interested in students' health behaviours and were informed that they had the right to opt-out of taking part or to withdraw from the study at any time. Participants did not receive an incentive to take part in the study. Two participants were excluded from further analysis, as they did not answer the dependent variable question. The study was approved by the Faculty Research Ethics Committee (reference number FBL/14/10/07).

5.2.2 Materials

Filler task.

To make sure that the prediction question and the behaviour measurement (the dependent variable) did not occur on the same page and seemed unrelated, a short filler question was added. This filler question consisted of a matrix of 200 random single digits. Participants were asked to underline every number 3 in this matrix. An example line of ten digits showed how they were supposed to complete the matrix. In

subsequent studies, the same type of filler task was used, but the number the participants had to underline varied, as well as the size of the matrix depending on the space left on the page of the questionnaire with the experimental question. An example of the filler task can be found in Appendix III.

5.2.3 Procedure Study 1A

The study consisted of two conditions, a prediction condition and a no-prediction condition that served as control group. Participants in the prediction condition were informed that daily exercise is important for personal health and were asked: "Do you predict that you will go for daily walks? (Walks longer than 30 minutes.) [Yes/No]" In addition, they were asked how certain they were of their prediction on a seven-point-scale ranging from "Not at all certain" to "Very certain." After answering these two questions, participants completed a short filler task and were then asked to report how many times they walked for more than 30 minutes during the last week on an eleven-point-scale ranging from "0 times" to "more than 10 times." Then the participants completed a couple of demographic questions and were thanked for taking part in the study. The procedure for the no-prediction condition was similar, with the only difference being that the participants in this condition were not informed about the need for daily exercise or being asked the two questions related to a future behaviour prediction and their level of certainty of the prediction (see Figure 5 for an overview of the procedure).

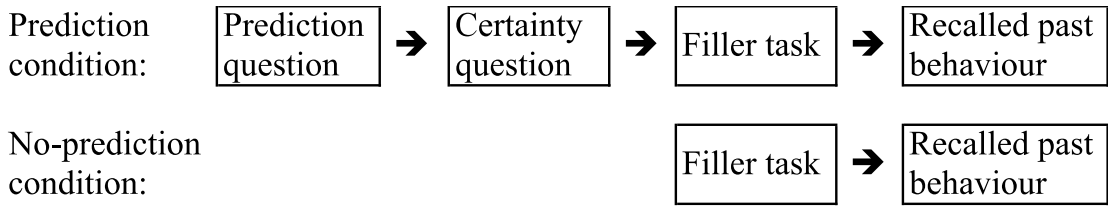

Figure 5. Flowchart of the procedure used in Study 1A and 1B.

5.2.4 Procedure Study 1B

The procedure was similar to Study 1A, while the focal behaviour was changed to brushing teeth. In the prediction condition, participants were informed that cleaning your teeth twice a day is important for personal hygiene and were asked: "Do you predict that you will clean your teeth twice a day? [Yes/No]" After a short filler task, they were asked to report how many days in the last week they went to bed without cleaning their teeth on an 8-point-scale (0-7 days). As in Study 1A, the no-prediction condition received the same questionnaire as the prediction condition but without mentioning the behaviour, or being asked the prediction and certainty questions (Figure 5).

5.2.5 Data Analysis Strategy

In recent years, the debate over how to report statistics and what kind of information needs to be included in a results section has increased. The emphasis is shifting from *p*-values and null-hypothesis significance testing (NHST) in general towards effect sizes and clinical significance. In fact, some psychology journals have made statements about banning or reducing the number of *p*-values reported (e.g. *Psychological Science* (Eich, 2014). The trend is to leave NHST and to move on to other ways of analysing data, such as reporting effect sizes and confidence intervals or Bayesian modelling.

As the studies reported in this PhD thesis were conducted while no consensus in the scientific field has been reached, all studies will include both *p*-values and effect sizes with 95% confidence intervals. A 95% confidence interval provides information about significance testing, as a confidence interval of Cohen's *d* including zero is not statistically significant, while a confidence interval not including zero is significant at a significance level of $\alpha = .05$. This might seem like repeating the same finding in two ways. However, providing both statistics can prevent confusion about the results in this transition phase in data-analysis methods. In addition, adding effect sizes and confidence intervals makes it easier to compare the findings of the experimental studies with the findings of the conduced meta-analysis in the current PhD thesis.

5.3 Results and Discussion Study 1A

In the prediction condition, 66.67% of the participants predicted they would go for daily walks in the future. They were moderately certain of their prediction (M = 5.35, SD = 1.30). There were no significant differences between the prediction condition (M = 4.48, SD = 3.16) and the no-prediction condition (M = 4.65, SD = 3.40) on recalled past walking behaviour, $t(95) = 0.26$, $p = .80$, $d = -0.05$, 95% CI [-0.45, 0.35], meaning that the hypothesis that asking participants to predict their future behaviour would increase the recalled past behaviour was not supported (see Table 4 and Figure 6).

The data showed that people who were asked a prediction question about their future walking behaviour were likely to over-predict their behaviour compared to the behaviour a control group. In the prediction condition, 66.7% of the participants predicted to go for daily walks, while only 2.0% of the control group went for daily

walks during the last week (a score of seven on the question of how many times they went for a walk during the last week). However, the hypothesised increase in reported behaviour was not found. In fact, there was a very small, non-significant effect in the opposite direction. Given the size of the effect, this difference between conditions is likely to be random noise and not a meaningful effect size.

If the question-behaviour effect is driven by cognitive dissonance, there are two possible explanations as to why the effect did not occur. First, participants might have found other ways to cope with a feeling of dissonance. They might have justified not going for daily walks by recalling other physical activities they employed during the week, such as cycling, playing sports or working out at a gym. This might have resulted in participants not feeling any distress about not doing daily walks, since they engage in other activities to reach their exercise goals. The second explanation is that the behaviour takes a considerable time, as daily walks were defined as walking for at least 30 minutes, and therefore participants might found it easy to remember how often they went for those walks during the last week, which allowed for less leeway in interpretation of what counts as going for a walk. This might have made it more difficult for participants to over report their walking behaviour.

Table 4. Number of participants answering 'yes' on the prediction question, means, standard deviations and group sizes for the four conditions in Study 1A and 1B.

	Participants predicting 'yes'	M	SD	N
Walking no-prediction	-	4.65	3.40	49
Walking prediction	32	4.48	3.16	48
Brushing teeth no-prediction	-	1.19	1.92	54
Brushing teeth prediction	47	0.73	1.32	49

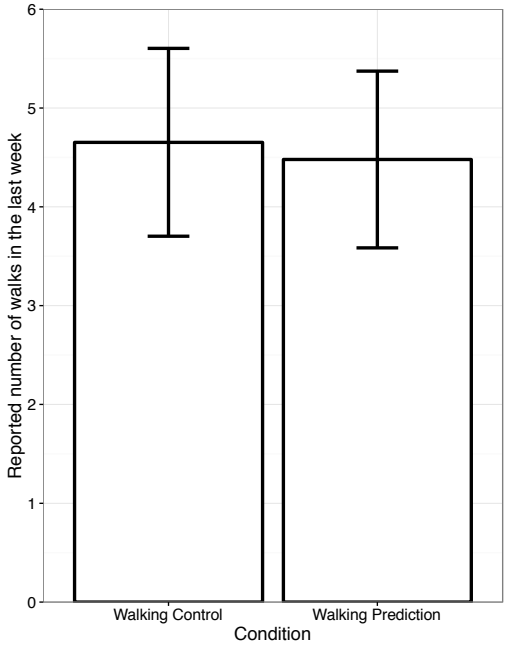

Figure 6. Means and 95% CI of control and prediction conditions on walking behaviour.

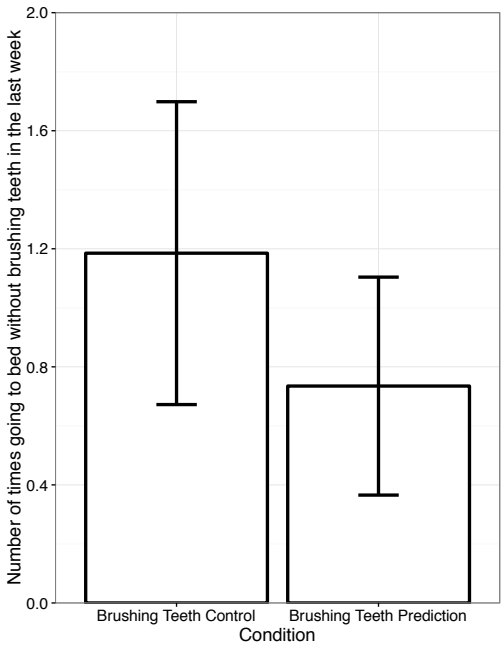

Figure 7. Means and 95% CI of control and prediction conditions on brushing teeth.

5.4 Results and Discussion Study 1B

In the prediction condition, 95.9% of the participants predicted they would brush their teeth before they go to bed in the future. They were certain of their prediction (M = 6.22, SD = 1.08). There was a small, negative effect for the experimental condition (M = 0.73, SD = 1.32) compared to the no-prediction condition (M = 1.19, SD = 1.92) on recalled number of times the participants went to bed without brushing their teeth, $t(101) = 1.40$, $p = .08$, d = -0.28, 95% CI [-0.67, 0.11]. The small, negative effect size supports the hypothesis that asking participants to predict their future behaviour would reduce negative past behaviour (see Table 4 and Figure 7) and the absolute effect size is in line with the effect size found in the meta-analysis.

As in Study 1A, the data of Study 1B also shows that people over-predict their future behaviour as the majority (47/49 participants) predicted they would clean their teeth twice a day, while the participants in the control group go to bed without

brushing their teeth approximately once per week (M = 1.19, SD = 1.92). In this study, a small effect in the hypothesised direction was found, but the effect was not statistically significant.

There are two explanations for not finding a significant result. The first explanation might be the baseline of the behaviour. In the no-prediction group, 57.4% answered "zero" on the question how many days in the past week they went to bed without brushing their teeth. This is an indication of a possible floor effect, as more than half of the participants reported the lowest number of times they went to bed without brushing their teeth as possible. This floor effect decreases the chance of detecting a statistically significant effect. The effect size was in line with the outcome of the conducted meta-analysis ($d_{absolute}$ = 0.28 versus 0.26 in the meta-analysis). More importantly, the effect was negative, showing that participants who predicted their future brushing behaviour reported less times of going to bed without brushing their teeth. The second explanation is that a post-hoc power analysis showed that the study had a power of 40.7%, which means the study did not have a sufficient number of participants to detect a statistical significant difference given the found effect size that is similar to the effect size in found in the meta-analysis.

The direction of the effect size cannot be explained by attitude activation, as discussed in the introduction but is in line with a cognitive dissonance explanation of the question-behaviour effect. Participants under-reported their past behaviour regarding going to bed without brushing their teeth compared to a control group.

5.5 Conclusion

While the expected results based on the study by Spangenberg and colleagues (2012) were not found in Study 1A, the findings of Study 1B suggest that cognitive

dissonance drives the question-behaviour effect. The question remains why Study 1A could not replicate the basic question-behaviour effect. An explanation related to the method used is that the finding might be due to a difference in the scale used to measure the outcome behaviour. Instead of asking participants to indicate how often they performed the behaviour in a given time interval, Spangenberg and colleagues used a 10-point scale with the anchors “absolutely never” and “absolutely every time” (Spangenberg et al., 2012, p. 217). This is less precise compared to asking for a specific number of times that participants have performed a behaviour and might offer more leeway in terms of optimistic reporting of past behaviour for the participant.

In the next chapter, a study investigating this difference between different types of response formats is reported. In this study those two different answering possibilities were compared on recalling past behaviour towards a new negative behaviour: procrastination.

CHAPTER 6

STUDY 2: LIKERT-TYPE SCALES OR TIME-FREQUENCY RESPONSE FORMATS

6.1 Introduction

As discussed in the literature review, several methods have been used to measure the dependent variable in question-behaviour effect research. For example, the focal behaviour is measured by asking participants to report their past behaviour (e.g. Spence, Burgess, Rodgers, & Murray, 2009) or by objective behaviour measurements (e.g. Chandon, Morwitz, & Reinartz, 2004). In the meta-analysis, the moderator analysis for "type of outcome" measurement showed that the effect of asking questions about behaviour on subsequent behaviour is present both when self-reported behaviour or objective behaviour measurements are used. In terms of how self-reported behaviour is measured, some studies used time-frequency response formats to assess the exact number of times participants engaged in a certain behaviour in a set period (e.g. Levav & Fitzsimons, 2006) while others used likert-type scales that included more vague options such as "a 7-point scale varying between (1) not at all to (7) four or more times a week" (Godin et al., 2011, pp. 2–3). While both types of questions offer an easy way to investigate changes in behaviour, only the first provides a comprehensive way of quantifying the effect for a layperson. So far, no studies have investigated the difference between answering using a likert-type scale versus a time-frequency response format. These two different approaches could have an impact on the effects of asking future prediction questions. Study 1A may not have shown an effect because of the very specific answering possibilities, where participants were asked to recall the number of times they had walked for more than

30 minutes in the past week. Similarly, the effect of Study 1B might not have been detected with vaguer, likert-type, options such as “never”, “sometimes”, “all the time.” The first goal of the present study (Study 2) is to replicate the findings of Study 1B, that recalled past behaviour regarding a negative focal behaviour is reduced after predicting future behaviour, for a different focal behaviour, procrastination. The second goal of Study 2 is to investigate whether the effect is different for likert-type or time-frequency response formats.

6.1.1 Procrastination

There are several reasons why procrastination is a suitable focal behaviour for this study. Whilst procrastination was not investigated in the behaviour questionnaire that served as a basis for choosing the focal behaviours for Study 1A and 1B, the questionnaire did include skipping classes. Two-thirds of the students had experience with deliberately skipping classes. Since there might be acceptable reasons for skipping classes, e.g. doctor appointments, it is difficult to define skipping a class as a negative behaviour that can be influenced. Procrastination in relation to studying seems a more useful focal behaviour compared to skipping classes, as procrastination can be defined in a broader sense, and it is harder to justify procrastination being a positive behaviour. Also, the assumption is that procrastination is considered a negative behaviour in general and that students view procrastination as something that they should avoid. Similar to avoiding going to bed without brushing your teeth, reducing procrastination behaviour would be considered a positive outcome. Therefore, a negative effect of asking a prediction question related to procrastination on actual procrastination behaviour is expected. A final reason for using procrastination as the focal behaviour is that procrastination is not as embarrassing a

behaviour as not brushing your teeth before going to bed might be. So students who procrastinate might be more likely to admit that they engage in the focal behaviour, thereby reducing the chance of finding floor or ceiling effects as in Study 1B.

Given the percentage of students that have experience with skipping classes, it is to be expected that students are familiar with procrastination in some way, either by procrastinating themselves, or having heard of other students struggling to focus on their work. In addition, procrastination can be defined in a vague ("How often do you do this?") and a more exact manner ("How many times have you procrastinated during the last week?). This difference in question type is needed to investigate whether using likert-type answering possibilities results in different effect sizes compared to conditions with time-frequency answering possibilities.

6.1.2 Present Study

In the present study, two prediction conditions were compared with their respective no-prediction control conditions. The dependent variable measurement was manipulated to be either a likert-type scale ("How often do you perform this behaviour?" [An 11-point scale with Never –All of the time]), or a time-frequency response format ("How often have you performed this behaviour in the last week?" [An 11-point scale with 0 times – 10 times and more than 10 times]).

Based on Study 1B, which provided some evidence for cognitive dissonance as the underlying mechanism of the question-behaviour effect and the methods used by Spangenberg et al. (2012), the hypothesis is that the comparison between prediction question with likert-type answering possibilities and its no-prediction control group will show an increased negative effect size compared to the prediction and no-prediction control with time-frequency answering possibilities.

6.2 Method

6.2.1 Design

The study used a 2 (Prediction: yes vs. no) * 2 (Answering scale: likert-type vs. time-frequency) between-subjects design with recalled past behaviour as dependent variable. Participants were assigned randomly to one of the four conditions.

6.2.2 Participants

In total, 299 students took part in this study, 50.8% female, M_{age} = 21.21, *SD* = 2.75. A small part of the students were asked to fill in a short questionnaire during classes, while the majority was approached on campus. Students were told that the questionnaire was about their studying behaviour and that all their responses would be recorded anonymously. They had the right to opt-out of taking part or to withdraw from the study at any time. Participants did not receive an incentive to take part in the study. One participant did not fill in the question regarding the dependent variable and was therefore excluded from further analysis. The study was approved by the Faculty Research Ethics Committee (reference number FBL/14/10/07).

6.2.3 Procedure

The procedure was similar to Study 1A and 1B. Students were assigned randomly to one of the four conditions. Participants in the two question-behaviour effect conditions received a questionnaire with a prediction question ("Do you predict you will focus on studying while preparing for your exams?" [yes/no]) and a certainty question ("How certain are you about your prediction?" with a 7-point Likert-scale [not at all certain – very certain]), while participants in the no-prediction control

conditions received a questionnaire without a prediction and certainty question. Following this, participants in all four conditions completed a short filler task to conceal the goal of the study. This filler task was similar to that in Study 1A and 1B where participants had to underline a certain digit each time it occurred in a matrix. Participants were then asked one of two questions: "How often do you procrastinate?" with answering possibilities "0 (Never)" to "10 (All of the time)" which acted as the likert-type answering scale, or "How many times have you procrastinated during the last week?" with answering possibilities "0 times" to "more than 10 times", which was considered to be the time-frequency answering scale condition. In the time-frequency condition, each option had its own label, while in the likert-type scale condition, only the first and last options were labelled. The participants then provided demographic information and were thanked for taking part in the study (see Figure 8 for an overview of the procedure).

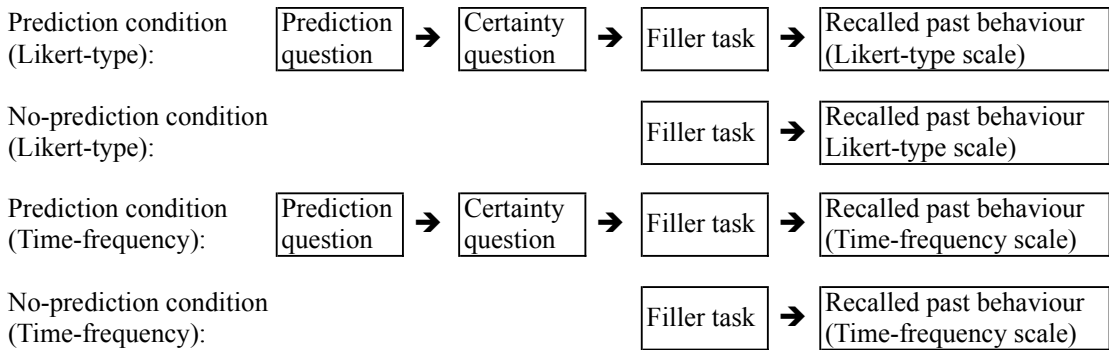

Figure 8. Flowchart of the procedure used in Study 2.

6.3 Results

In the prediction conditions, 63.1% of the participants (94/149) predicted that they would focus on studying during their exam period. The number of participants saying they would do so did not differ significantly across the two conditions ($\chi^2(1) =$

0.01, p = .92). In both prediction conditions, the number of participants answering "yes" was equal (47 of the 75 participants in the time-frequency condition and 47 of the 74 participants in likert-type scale condition). In addition, participants were moderately certain of their prediction (M = 5.17, SD = 1.16).

There was no significant difference between the likert-type prediction condition (M = 6.58, SD = 1.92) and the likert-type no-prediction condition (M = 6.45, SD = 2.42) on recalled past procrastination behaviour, $t(146) = 0.38$, p = .71, d = 0.06, 95% CI [-0.26, 0.38]. This means that there is no support for the hypothesis that using a likert-type answering scale would result in an increased negative effect (see Table 5 and Figure 9). For the time-frequency answering possibility conditions, a small effect was found for the time-frequency experimental condition (M = 6.85, SD = 3.46) compared to the time-frequency control condition (M = 5.77, SD = 3.42) on recalled past procrastination behaviour, $t(148) = 1.92$, p = .06, d = 0.31, 95% CI [-0.01, 0.64]. The effect size showed that asking a prediction question resulted in more recalled procrastination behaviour (Table 5 and Figure 10). This effect is in contrast with the hypothesis that the participants in the prediction condition would report less procrastination compared to the no-prediction control group.

Table 5. Number of participants answering 'yes' on the prediction question, means, standard deviations and group sizes for the four conditions in Study 2.

	Participants predicting 'yes'	M	SD	N
Likert-type scale: no-prediction	-	6.45	2.42	74
Likert-type scale: prediction	47	6.58	1.92	74
Time-frequency scale: no-prediction	-	5.77	3.42	75
Time-frequency scale: prediction	47	6.85	3.46	75

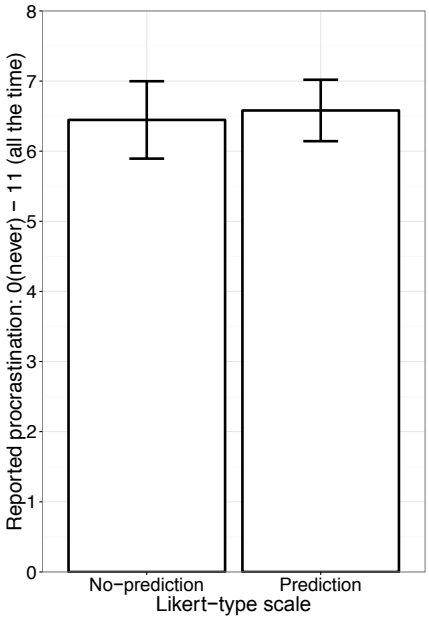

Figure 9. Means and 95% CI of control and prediction conditions on procrastination behaviour using a likert-type scale.

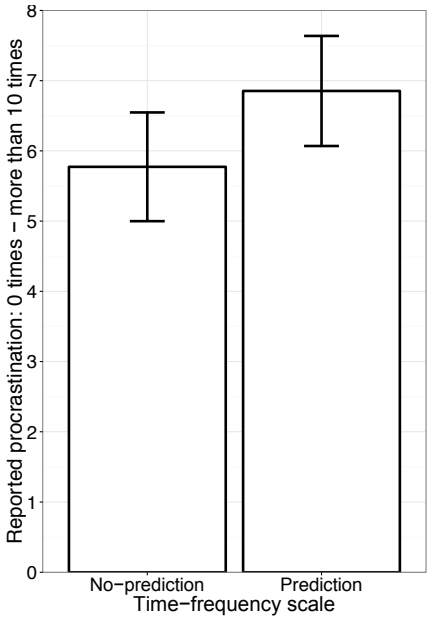

Figure 10. Means and 95% CI of control and prediction conditions on procrastination behaviour using a time-frequency scale.

6.4 Discussion

6.4.1 Summary of the Findings

The hypothesis was that the question-behaviour effect would be stronger in the likert-type answering conditions compared to the time-frequency answering conditions. This hypothesis was not supported as the results showed that there was an small effect of the prediction question on recalled behaviour in the time-frequency answering possibilities conditions, but no effect in the likert-type answering possibilities conditions. Also, instead of finding a reduced number of procrastination occasions, predicting future studying behaviour increased recalled past procrastination behaviour. The effect size indicates a small to medium effect ($d = 0.31$) that cannot be ignored. So instead of confirming the results of study 1B, that asking about a negative behaviour will reduce recalled past behaviour, this study showed the opposite effect.

In addition, asking people to report their behaviour in a likert-type instead of a time-frequency manner did not increase the effect. This suggests that the null-finding in Study 1A cannot be explained merely by the dependent behaviour being measured through the use of a time-frequency response format.

6.4.2 Possible Explanations

The question remains how the effects found in Study 2 can be explained. There are several possibilities why asking people to predict their future studying behaviour resulted in an increase in reported procrastination behaviour. It might be that procrastination is not viewed as a negative behaviour, or maybe students do not know what procrastination is and assume it has a positive connotation, which causes them to over report recalled past behaviour. If procrastination is viewed as positive, or if students are not sure about whether procrastination is a negative behaviour, this could explain the finding of increased reported behaviour compared to the control group. A follow-up questionnaire was designed to address these explanations. One final explanation is the discrepancy between the prediction question and the measurement of the dependent variable. The prediction question asks about studying behaviour, while the dependent variable is procrastination behaviour. It is possible that this difference in framing influenced the direction of the effect.

6.5 Follow-Up Questionnaire

The follow-up questionnaire consisted of four questions to address some of the alternative explanations mentioned in the previous section. These four questions were: “In your own words, how would you define procrastination?”, “How good or bad is procrastination?” (7-point Likert scale, 1 equals “very bad”, 7 equals “very good”),

"How guilty do you feel about procrastinating?" (7-point Likert scale, 1 equals "not at all guilty", 7 equals "very guilty") and "In the past, has procrastination influenced your marks?" (Four answering possibilities: Yes, in a positive way; Yes, in a negative way; No; I don't know.) Students were approached on campus with the request to fill in this short questionnaire. A total of 30 students completed the questionnaire.

6.6 Results and Discussion

The majority of the students (26/30 or 86.67%) knew the definition of procrastination. Students also felt that procrastination was moderately bad ($M = 2.93$, $SD = 1.23$) and felt moderately guilty about their procrastination behaviour ($M = 5.13$, $SD = 1.36$). In addition, 66.67% of the students (20/30) stated that procrastination had influenced their marks in a negative way in the past. This follow-up questionnaire indicates that students know what procrastination is, are aware of its negative connotations and feel that procrastination has a negative influence upon their academic achievements. Therefore, the two alternative explanations, that students might not know what procrastination is or see procrastination as a good thing, seem unlikely. This also means that it is unlikely that students overestimated their past procrastination behaviour because of cognitive dissonance.

6.7 General Discussion

Apart from the explanations provided earlier, future research should look further into the different answering possibilities used in question-behaviour effect research. Different behaviours might need different types of dependent variable questions to detect effects of asking questions on subsequent behaviour. For example, behaviours such as going to bed without brushing your teeth, are easily measured in a

precise way because it is related to a daily behaviour, it is well defined and it is relatively easy for participants to remember whether they did or not. In comparison, behaviours such as recycling are much harder to measure in a precise way as it is less clear cut what is considered recycling and people might find it harder to recall their past behaviour related to the topic. In those cases, scales ranging from 'never' to 'all the time' might be an option to detect an effect that cannot otherwise be found with more specific answering possibilities.

The finding of the present study that no question-behaviour effect was detected when a likert-type answering scale was used raises the question as to whether the previously reported effects in question-behaviour effect research in self-reported behaviour are purely methodological instead of reflecting true changes in behaviour. In the meta-analysis, 40 comparisons used a dichotomous dependent variable, while only 15 comparisons applied a continuous scale to measure the dependent variable. An experimental approach as to whether behaviour is measured as a dichotomous or a continuous process can help understand possible methodological limitations of the question-behaviour effect.

Based on the findings in this study, future research could include studies that incorporate both self-reported behaviour in different ways (e.g. likert-type and time-frequency scales), as well as objective behavioural measurements. This would not only add to the findings by using future behaviour measurements, but also test the moderator analysis on type of dependent variable in the meta-analysis experimentally. The value of self-reported behaviour can be determined by experimentally comparing these different dependent variables across a range of behaviours. In addition, these comparisons can be used to determine the optimal method for detecting effects that

reflect real changes in behaviour. The present study showed a small positive effect, where a negative effect was hypothesised. The question remains why that is the case.

As shown in the follow-up study, students felt moderately guilty about procrastination and believed procrastination was moderately negative, indicating a negative attitude towards procrastination. Participants' perception of the focal behaviour might be key in determining the direction of a question-behaviour effect. If that is the case, changing the way people perceive the focal behaviour influences the outcome of a question-behaviour effect intervention. In the next study, positive and negative injunctive norm primes regarding the focal behaviour are added to a prediction question to influence the perceptions people have about another behaviour that students engage with according to the behaviour questionnaire: buying bottled water on campus.

CHAPTER 7

STUDY 3: ADDING BEHAVIOURAL NORMS

7.1 Introduction

The previous study showed an increase in reported procrastination behaviour after participants were asked to predict whether or not they would focus on studying during the exam period, but only when a time-frequency answering scale was used. Since study 1B showed that asking people questions about a negative behaviour reduced the reported negative behaviour, this outcome was unexpected. However, as mentioned in the discussion section of Study 2, this result might be related to the way these two behaviours are perceived. Going to bed without brushing your teeth can be perceived as worse than occasional procrastination. Therefore, asking to predict whether you will or will not brush your teeth might prime a stronger norm than asking questions about focusing on studying and procrastination behaviour. If these behaviours are linked to different norms, the presence of a norm might be key in causing a change in behaviour after being asked to predict future behaviour.

7.1.1 Norms

A norm can be defined as a belief held by an individual regarding what they think people should do and what these people actually do (e.g. Andrews, 1996; Cialdini, 2003), or, more specifically, "norms refer to knowledge or mental representations of appropriate behaviour that guide behaviour in a certain situation or environment" (Aarts & Dijksterhuis, 2003, p. 18). Sherif (1935) showed that norms can influence behaviour. He showed that people take into account the behaviour of others when deciding how to behave themselves. The conformity study by Asch

(1951) showed that when people are in groups, they tend to follow the opinion of the group. He showed that participants were affected in their judgement of a line comparison question by the answers of others (confederates in the study, who seemed to be fellow participants in the eyes of the actual participant), even when these answers were clearly wrong. People acquire norms by learning what behaviour others would (not) approve of (Cialdini & Trost, 1998). In addition, people can acquire norms by looking at what others do (Cialdini, Kallgren, & Reno, 1991), as was the case in the Asch' conformity study.

7.1.2 Different Types of Norms

There are different types of norms. Cialdini, Reno and Kallgren (1990) identified differences between what people do (descriptive norms) and what people think they are supposed to do (injunctive norms) in terms of cognitive processes. They argued that descriptive norms are easier to process, whereas injunctive norms require more thought. The influence of descriptive norms on behaviour is shown in a classic study where informing hotel guests about the percentages of people who reuse their towels in their hotel rooms increased the percentage of guests doing the same thing from 37.2% to 49.3%, a large effect given the small intervention (N. J. Goldstein, Cialdini, & Griskevicius, 2008, p. 477). However, descriptive norms merely state how people are behaving and therefore do not address what people should be doing. In comparison, injunctive norms focus on what people should be doing, not necessarily taking into consideration the actual behaviour of people. In a study on the use of free shopping bags in a UK supermarket, using an injunctive message reduced the number of shopping bags used by customers (de Groot, Abrahamse, & Jones, 2013). While the two types of norms are different, recent

research has shown that activating one norm might also activate the other (Eriksson, Strimling, & Coultas, 2015). They found that the concepts of what is 'common' (the descriptive norm) and what is 'morally right' (the injunctive norm) are strongly associated.

Applying the knowledge about norms to the results of Study 2, this could mean that if procrastination is not being perceived as vice behaviour, injunctive norms stressing the negative aspects of procrastination could have influenced the direction of the effect.

If a small intervention such as priming people with norms as shown by Goldstein et al. (2008) can have a large effect on behaviour, then priming participants with a norm before asking them to predict their future behaviour might affect the direction and magnitude of a question-behaviour effect intervention. This hypothesis is the basis of the third study.

7.1.3 The Present Study

The behavioural questionnaire in the pilot study revealed several behaviours that could be of use in question-behaviour effect research. One behaviour that most students were familiar with, and performed almost twice a week, was buying bottled water on campus. This behaviour is ideal as a focal behaviour for the current study, as it is easy to identify positive and negative aspects of buying bottled water, and it is therefore also simple to prime participants with these positive or negative aspects. Reasons to encourage students to buy bottled water include preventing dehydration, and that it is a healthy alternative in comparison to fizzy or alcoholic drinks. In the same manner, reasons to discourage buying bottled water can be that the production

process, in which a lot of plastic is used, is bad for the environment, or that it is more expensive than drinking tap water.

While these priming messages are subtle and could be seen as persuasive messages, they relate to injunctive norms. Injunctive norms have been activated in various ways in the past. For example, de Groot and colleagues used signs with the text "Shoppers in this store believe that re-using shopping bags is a worthwhile way to help the environment. Please continue to re-use your bags" (de Groot et al., 2013, p. 1837), to influence supermarket customers to re-use their shopping bags. Cialdini used "Please don't remove the petrified wood from the Park, in order to preserve the natural state of the Petrified Forest."(Cialdini, 2003, p. 107) as injunctive norm, showing that the norm does not needs to include a source, as the de Groot study did by adding the shoppers' opinion. Others used a confederate that showed the desired behaviour as a prime of the injunctive norm (Reno, Cialdini, & Kallgren, 1993). Highlighting positive or negative aspects of a behaviour can be seen as injunctive norm as it explains why a certain behaviour should (not) be performed.

If norm primes influence the direction of a question-behaviour effect intervention, it is expected that a negative injunctive norm will reduce the likelihood of a participant predicting to buy bottled water on campus. In addition, a positive injunctive norm would achieve the opposite and increase the chances of participants predicting they would buy bottled water on campus. The first hypothesis is that participants who are not asked to predict their future behaviour will report their purchasing behaviour in line with the norm primes. The second hypothesis is that participants who are asked to predict their future behaviour will act upon their prediction and underreport their past behaviour in the negative prime conditions and over-report their past behaviour in the positive prime conditions compared to the no-

prediction norm prime conditions. These hypotheses are in line with the cognitive dissonance explanation of the question-behaviour effect. Attitude activation, on the other hand would predict an increase in recalled past behaviour regarding buying bottled water, regardless of the kind of norm that is activated (positive or negative) as explained in Study 1.

7.2 Method

7.2.1 Design

The study used a 2 (Norm: negative vs. positive) * 2 (Prediction: yes vs. no) between-subjects design with recalled past behaviour as dependent variable. Participants were assigned randomly to one of the four conditions.

7.2.2 Participants

In total 267 students took part in this study, 61.8% female, M_{age} = 21.20, SD = 3.43. The majority of the participants were asked to fill in a short questionnaire during classes, whilst others were approached on campus. Students were told that the questionnaire was about students' behaviour and that all of their responses would be recorded anonymously. Students were informed that they had the right to opt-out of taking part or to withdraw from the study at any time. Students did not receive a reward for taking part in the study. The study was approved by the Faculty Research Ethics Committee (reference number FBL/15/03/30).

7.2.3 Procedure

The procedure was similar to the previous studies, except all participants in all conditions were primed with an injunctive norm message. Participants read a sentence

that either conveyed a positive ("Drinking enough water is important to prevent dehydration.") or a negative injunctive norm message ("Buying bottled water is bad for the environment."). To ensure that participants had read the sentence, they were asked to write down the number of words in the injunctive norm prime sentence. A second reason to add this question was to ensure that the participants in the control condition paid attention to the injunctive norm prime, as they ostensibly did not do anything else with the prime, and otherwise would have moved on to a filler task straight after the injunctive norm prime was presented. Following the number of words question, the participants in the prediction conditions were asked to predict their future behaviour, "Do you predict you will buy bottled water on campus in the future?" All participants then completed a short filler task. This filler task was similar to the one used in the previous studies where participants had to underline a certain digit each time it occurred in a matrix. After this task, all participants were asked to report how many times they had bought bottled water during the last week on a scale from "0 times" to "more than 10 times", which was the dependent variable of the study (see Figure 11 for an overview of the procedure). The participants then provided some demographic information and were thanked for taking part in the study.

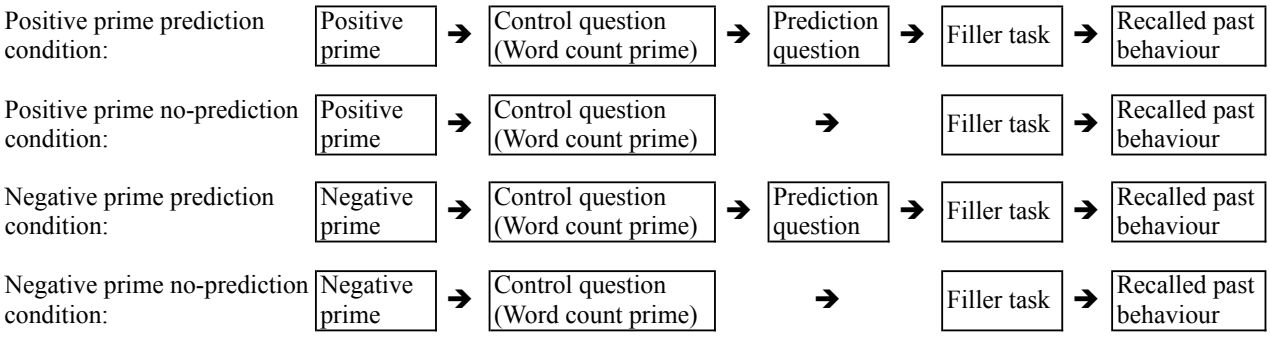

Figure 11. Flowchart of the procedure used in Study 3.

7.3 Results

7.3.1 Manipulation Checks

All scores on the dependent variable, how often participants had bought bottled water on campus, which deviated from the mean by more than three standard deviations were removed from the sample. This reduced the total N from 267 to 264.

In total, 79.9% of the participants (89/131) in the prediction conditions answered that they would buy bottled water on campus in the future. There was no difference between the two prediction conditions on number of people stating they would buy bottled water on campus, $\chi^2(1) = 0.47$, $p = .58$, indicating that the injunctive norm prime did not affect the answers on the prediction questions.

To investigate whether the positive and negative injunctive norm messages influenced the dependent variable and to therefore investigate whether the injunctive norm prime had an influence on participants, the two no-prediction control groups were compared. There was a significant difference between the no-prediction control conditions of the negative message ($M = 1.06$, $SD = 1.56$) and the positive message ($M = 1.67$, $SD = 1.75$) on recalled past behaviour regarding buying bottled water indicating a small positive effect, $t(131) = 2.10$, $p = .037$, $d = 0.37$, 95% CI [0.02, 0.71], thus the first hypothesis that providing participants with a injunctive norm message would influence their recalled past purchasing behaviour was supported.

7.3.2 Norms and Prediction Questions

The no-prediction conditions were compared to their respective prediction conditions to investigate whether asking a prediction question influenced the effects of the injunctive norm prime. There was a small effect for the negative norm prediction condition ($M = 1.41$, $SD = 1.68$) compared to the negative norm control

condition (M = 1.06, SD = 1.56) on recalled past behaviour, $t(127) = 1.21$, $p = .23$, d = 0.21, 95% CI [-0.13, 0.56]. As such, regarding the negative norm conditions, the second hypothesis that asking a prediction question would result in lower levels of recalled past behaviour for the negative norm prime conditions was not supported. For the positive norm conditions, a similarly small negative effect for the positive norm prediction condition (M = 1.34, SD = 1.42) compared to the positive norm control condition (M = 1.67, SD = 1.75) on recalled past behaviour was found, $t(133) = 1.22$, $p = .23$, d = -0.21, 95% CI [-0.55, 0.13]. So, regarding the positive norm conditions, the second hypothesis that asking a prediction question would result in higher levels of recalled past behaviour for the positive norm prime conditions was not supported (see Table 6 and Figure 12). A closer look at the data revealed a marginally significant interaction effect, suggesting that the injunctive norm prime only had an effect when no prediction question was asked, $F(1, 260) = 7.59$, $p = .09$.

Table 6. Number of participants answering 'yes' on the prediction question, means, standard deviations and group sizes for the four conditions in Study 3.

	Participants predicting 'yes'	M	SD	N
Negative prime no-prediction	-	1.06	1.56	63
Negative prime prediction	43	1.41	1.68	66
Positive prime no-prediction	-	1.67	1.75	70
Positive prime prediction	46	1.34	1.42	65

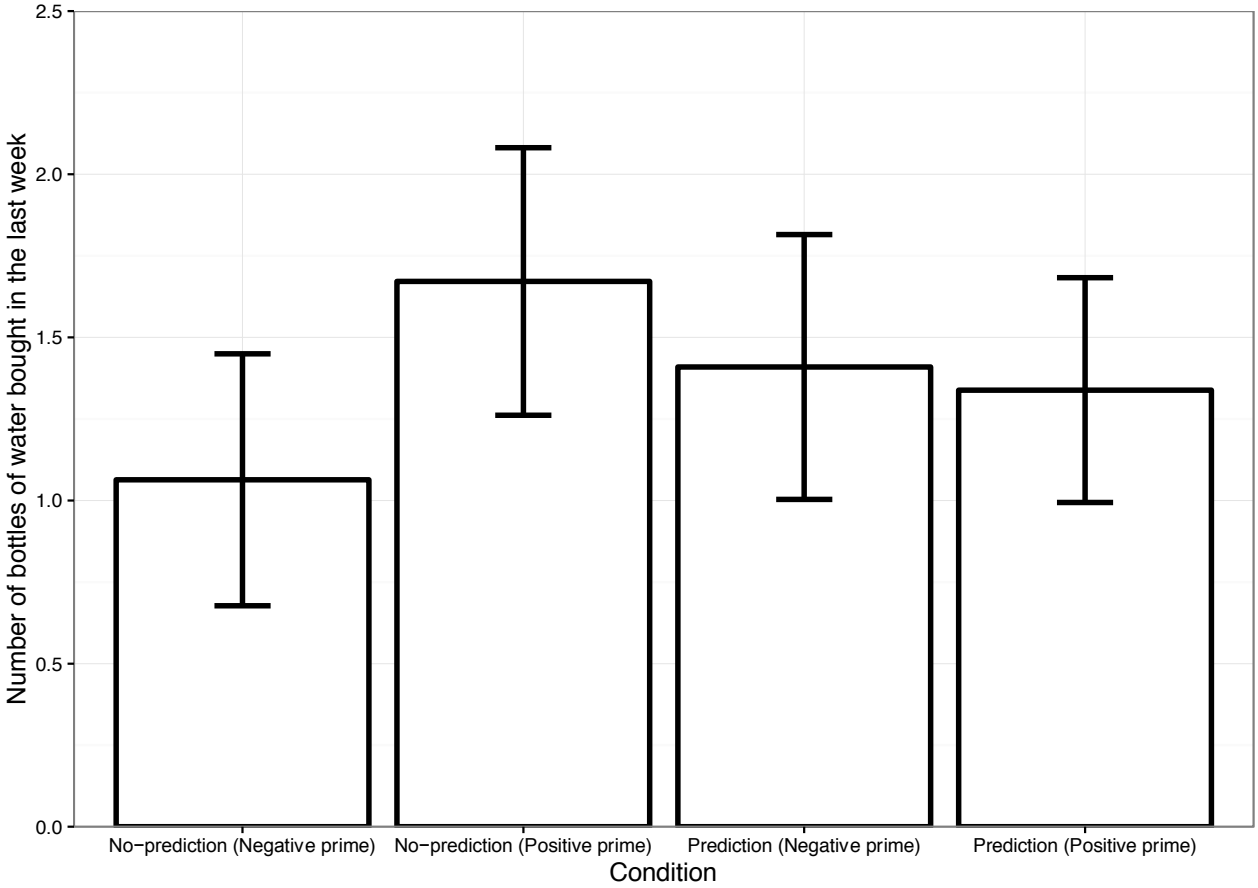

Figure 12. Means and 95% CI of norms and norms plus prediction conditions on buying bottled water on campus.

7.4 Discussion

7.4.1 Summary of Findings

Even though the first hypothesis, that there would be a difference in recalled past behaviour between the positive and negative norm control groups, was supported, the effect was attenuated instead of inflated in the prediction conditions where people

were asked to predict their future bottled water purchasing behaviour. As mentioned in the introduction, an explanation based on cognitive dissonance theory predicts an increase in the positive injunctive norm plus prediction question condition, and a decrease in the negative injunctive norm plus prediction question condition compared to their respective no-prediction norm conditions. Attitude activation would predict an increase of past behaviour for both the positive and negative norm conditions.

7.4.2 Explanation of the Findings

Comparing the hypotheses with the actual data shows that the results of this study cannot be explained through the attitude activation or cognitive dissonance explanations of the question-behaviour effect. Attitude activation would suggest an increase in both prediction groups while only the negative norm plus prediction conditions showed this increase. Cognitive dissonance would suggest effects in the direction of the injunctive norms, while the data shows the opposite, as the effects of the prediction question seem to attenuate the influence of the norm.

The no-prediction control groups showed positive and negative effects for the related norm conditions. As there was no control group without a norm prime, it is difficult to identify whether the positive norm caused an overestimation of the actual behaviour, that the negative norm caused an underestimation of the actual behaviour, or that both had an effect.

7.4.3 Influence of Norms on Question-Behaviour Effects

Since both prediction conditions showed quite similar means (M = 1.34 versus M = 1.41) it seems that making a prediction about future behaviour overruled the injunctive norm prime in those conditions. Although the norm primes showed an

effect, it is unclear from this study whether this is merely a self-reporting behaviour effect, or that these participants would actually buy less/more bottled water as a result of the norm prime. If the norm prime influences actual behaviour, interventions which draw upon research that focuses on norms and the question-behaviour effect need to be adjusted so that the intervention only includes one of these two factors, as the combination seems to result in contrasting rather than additive effects.

If asking prediction questions overrules the effect of an injunctive norm prime, as the data seems to suggest, how can this finding be explained? It would be difficult to explain this from an attitude activation perspective, as the prediction group that received a positive norm prime showed a decrease in reported behaviour. It appears unlikely that adding the prediction question to a positive norm would activate negative attitudes towards buying bottled water. Explaining the effect from a cognitive dissonance stance would also prove difficult. The positive norm prime prediction group would feel that predicting "yes" would be a good thing, and therefore these people should then over-report instead of underreport their past behaviour. The negative norm prime prediction condition, being given a reason *not* to buy bottled water, should have resulted in a reduced, rather than increased, level of self-reported buying bottled water on campus behaviour.

It seems that the injunctive norm prime did not influence participants to change their future behaviour prediction regarding buying bottled water on campus. The percentage of people predicting "yes" in both the positive and negative norm prime prediction conditions was roughly the same (65.8% in the negative and 71.2% in the positive prediction condition). This adds to the explanation that the prediction question might have overruled the norm primes instead of being influenced by it. So, instead of being consistent with the norm primes (as cognitive dissonance would

predict) or increasing the reported past behaviour regardless of the norm (as attitude activation would predict) another underlying mechanism may have been present.

7.4.4 Social proof as Explanation of the Question-Behaviour Effect

Based on the findings in studies 1-3, one theory that might explain the results is social proof (Cialdini, 1993). Social proof might be related to the question-behaviour effect in two ways. The first possibility is that as social proof states that people are likely to conform to the behaviour of the majority. People might not make predictions in line with moral standards, but in line with the perceived behaviour of their peers. This would explain the increase in reported procrastination behaviour in Study 2. The second possibility is that social proof can help people decide what to do in a situation they have not encountered before. It might take less time and energy to think about what other people would do in the same situation, than it takes to come up with your own opinions, preferences and standards. So far, the question that has not yet been addressed in question-behaviour effect research is how sensible it is to ask people to predict their future behaviour. While asking people to predict their future behaviour seems normal in the question-behaviour effect literature, this type of question is not often asked outside of a research setting. Open ended questions such as "What are you doing this weekend?" might be common among peers, but specific prediction questions such as "Do you predict you will buy bottled water on campus in the future?" are rare.

7.4.5 Research on Social Proof

Research on social proof theorises that social proof has a large influence if people are not sure what to do and start looking for social cues within other peoples'

behaviour in order to do the right thing. Examples include the conformity studies conducted by Asch (1951) who showed that people were likely to conform to other peoples' judgments even when they could clearly see that the judgement was incorrect. Another example is a study by Milgram, Bickman and Berkowitz (1969) where a crowd of people stood on the street, looked at the sky, and caused pedestrians to either look at the sky as they walked past, or to stand still and join the crowd. Social proof has also been an effective tool in influencing online shopping behaviour (Amblee & Bui, 2011), promoting healthy choices in the supermarket (Salmon et al., 2015) and donating money to charity (Shearman & Yoo, 2007).

It may well be that participants who are asked specific prediction questions about their future behaviour, answer these questions by thinking of what they think their peers would do and then follow up on their prediction as a result of dissonance and consistency processes. Since participants might not have put much thought into their buying bottled water habits, it is possible that they focused on the expected behaviour of peers rather than their own judgement when they made a prediction about their future behaviour.

In summary, the concept of social proof might be linked to the question-behaviour effect. Before turning to Study 4, a small-scale correlational study to investigate social proof as underlying mechanism of the question-behaviour effect, the next chapter will cover an update on the published literature since the start of this PhD thesis.

CHAPTER 8

LITERATURE UPDATE

8.1 Meta-Analysis by Wood et al. 2015

Since conducting the meta-analysis and collecting, analysing and reporting the data for studies 1-3, other papers relating to the question-behaviour effect have been published. In particular, a meta-analysis on the phenomenon has been conducted and published (Wood et al., 2015). This meta-analysis included a total of 116 comparisons. The meta-analysis focused on question-behaviour effect interventions that used either intention questions or self-prediction questions as independent variable. Their overall effect size is similar to the one reported in the meta-analysis chapter ($d_{adjusted}$ = 0.24 versus d = 0.26) and they also report a possible publication bias, indicating the true effect could be smaller ($d_{adjusted}$ = 0.15 versus d = 0.11).

The meta-analysis by Wood et al. also showed that behaviours that are easier to perform are also more likely to be influenced by a question-behaviour effect intervention. This seems trivial, but could mean that there is a limit in terms of complexity for which type of behaviours a question-behaviour effect intervention could be used. The suggestion that easier behaviours are more likely to be influenced by asking questions links to the research on the question-behaviour effect and ease of mental representation (Levav & Fitzsimons, 2006), which has posited that the easier it is to imagine performing a behaviour, the larger the effect of a question-behaviour effect intervention will be.

In addition to the difficulty of the focal behaviour, moderators were tested regarding the underlying mechanisms of the question-behaviour effect. The coding of studies was performed by one author, while another author coded 20% of these

categorisations so an interrater reliability could be computed. These reliability ratings were calculated through intraclass correlations and resulted in correlations of .62 and higher for all moderators (Wood et al., 2015, p. 9). Wood et al. used moderator analysis to investigate underlying mechanisms of the question-behaviour effect such as attitude activation, cognitive dissonance and social desirability.

These moderators were coded in a number of questions on a five-point-scale to determine how likely it was that these mechanisms would play a role in the specific study. These codings were then correlated to the effect sizes of the different studies to investigate possible links between underlying mechanisms and the effect sizes of the question-behaviour effect interventions. The authors found little or no evidence for attitude activation or cognitive dissonance as the underlying mechanism of the question-behaviour effect. Other explanations, such as processing fluency and behavioural simulation were also not supported. However, the moderator analyses showed a significant effect of social desirability, indicating that a social desirability bias might drive the effect.

The difference in use of social desirability between the meta-analysis by Wood et al. (2015) and the one conducted as part of this thesis is that Wood et al. coded every study for social desirability while the study in the meta-analyses used type of outcome variable (self-reported behaviour versus objective behaviour measurement) as a tool to differentiate between socially desirable responding as part of the dependent variable measurement as cause for the question-behaviour effect to occur.

8.2 Social Desirability

The question is how the suggestion of social desirability as underlying mechanism of the question-behaviour effect relates to the design and findings of studies 1-3. If the hypotheses in those studies had been based on social desirability, they would not be very different from the hypotheses based on cognitive dissonance. It would be perceived as socially desirable to over-report walking behaviour (Study 1A) and underreport going to bed without brushing your teeth (Study 1B). Recalled past behaviour regarding procrastinating would also be reduced (Study 2) and it could be viewed as socially desirable to act in accordance with the primed norms in relation to buying bottled water (Study 3). All of these hypotheses follow the same direction for both cognitive dissonance and social desirability. Apart from Study 1B, all studies show different effects compared to the hypotheses from a cognitive dissonance/social desirability point of view. The question then becomes what might explain a correlation between social desirability and effect size, whilst also accounting for the findings from Study 1-3 into consideration. While social desirability correlates with the outcomes of the meta-analysis, another, closely related phenomenon might explain both findings: social proof.

8.3 Social Proof

Where social desirability relies on what people think society would want them to do, social proof suggests that people prefer behaving in line with the behaviour of the majority. If, instead of social desirability, social proof underlies the question-behaviour effect, this means that people answer the predicting question while thinking about what their peers would do in a similar situation. Although the difference between social desirability and social proof seems small, they are fundamentally

different. Behaviours are not perceived as good or bad, but as normal (popular) or deviant (unpopular). The coding of behaviours in terms of social (un)desirability or social proof might not be very different for the majority of behaviours, but might differ substantially for others.

In terms of studies 1-3, social proof would explain the increase in reported procrastination behaviour in Study 2 as students can be convinced that they should not procrastinate (social desirable outcome) but perceive all their fellow students engaging with procrastination behaviour (social proof). It could also explain the findings in Study 3, where predicting future behaviour attenuated the effects of the norm prime. The control groups are affected by the norms, while the participants in the experimental groups might be encouraged to contemplate their behaviour slightly longer and since this might have been the first time they were asked to predict their buying bottled water behaviour, they relied on what they know: what they see their friends do. The idea of social proof as underlying mechanism of the question-behaviour effect is the focus of Study 4.

CHAPTER 9

STUDY 4: SOCIAL PROOF SCORES

9.1 Introduction

The data of studies 1-3 seems to question the suggestion in a recently published meta-analysis that social desirability could be the underlying mechanism of the question-behaviour effect (Wood et al., 2015). In addition, the data of studies 1-3 seem to support both the attitude activation explanation and the cognitive dissonance explanation of the question-behaviour effect on different occasions. Study 1B suggested that recalled teeth brushing behaviour was influenced by cognitive dissonance, whereas Study 2 suggested that attitude activation caused the increase in recalled procrastination behaviour. Study 3 showed that regarding buying bottled water; predicting future behaviour after a positive or negative prime attenuated the effect of the prime. The question is whether or not there is a single theory that can explain all these findings and whether or not that theory also succeeds in predicting the strength and direction of question-behaviour effects regarding untested behaviours.

When cognitive dissonance is discussed in the question-behaviour effect literature, it is suggested that asking people to predict their behaviour increases the occurrence of this behaviour because people answer the prediction question in a socially desirable way (e.g. Spangenberg et al., 2003, p. 49). It is assumed that people ask themselves what would be the right thing to do, and answer the prediction question accordingly. Since they have made the prediction to act in a certain way, this leads to commitment and consistency, which makes the participants more likely to act upon their prediction. The data of studies 1-3 suggest that another explanation might

play a role. It could be that people ask themselves a different question when they are required to predict their future behaviour. Instead of asking "What would be the right thing to do?" they might ask themselves "What would others do?" This subtle difference has implications for the underlying mechanism of the question-behaviour effect, but also for the directions and effect sizes that are to be expected as a result of asking people to predict their future behaviour.

9.1.1 Social Proof

Asking yourself what others would do is the basis of the social proof phenomenon, that states that when people are unsure about how to behave, they tend to look at what other people do in the same situation (Sherif, 1935). This also relates to the literature on group conformity. Research in both of these areas states that when people do not know how to behave, they tend to look at what other people are doing (e.g. Asch' conformity studies, Asch, 1951). Since people are not often asked to predict their future behaviour, this can be a situation in which participants start thinking about what others would do, in order to decide what they think they will do themselves. They then alter their (reported) behaviour towards their perceived social norm.

This might explain some of the unexpected findings in studies 1-3. First of all, in Study 1A, participants can hold the belief that going for daily walks is "good" while at the same time believe that their peers do not go for daily walks very often, thereby not feeling the urge to overestimate their past walking behaviour. In Study 1B, participants may believe that not brushing your teeth is bad, and also that none of their peers goes to bed without brushing their teeth. Similarly in Study 2, while students know that procrastination is bad, they might also hold the perception that the

majority of students procrastinate anyway, so reporting increased procrastination is to be expected. Also, if social proof underlies the question-behaviour effect, and predicting future behaviour causes recalled past behaviour to be in line with the perceived norm, this could explain the findings of Study 3. In Study 3, predicting future behaviour attenuated the effect of a positive or negative norm, while it might actually have caused the participants to report their past behaviour in line with the perceived social norm.

In addition, social proof could explain some of the findings in the published question-behaviour effect research. For example, two of the three studies in the milestone paper by Sherman (1980) showed a decrease in number of participants performing behaviours after being asked to predict their future behaviour. These two behaviours were singing the national anthem through a telephone and writing a counter-attitudinal essay regarding dormitory rules (S. J. Sherman, 1980). Since both behaviours were personalised requests by a researcher (a personal visit regarding writing the essay, and a phone call to ask participants to sing the national anthem) and helping people could be considered desirable, social desirability would suggest that participants should be more, and not less, likely to comply with the request after being asked to predict their response. In comparison, social proof could lead participants to estimate how many of their peers would actually perform these behaviours and these estimations might be low as singing through the telephone can be an embarrassing experience and writing a counter-attitudinal essay would require time and effort.

9.1.2 The Present Study

While social proof could explain the findings of Study 1-3 as well as some of the findings of earlier question-behaviour effect research, it is clear that empirical

research is needed to find evidence for the validity of social proof as an underlying mechanism of question-behaviour effects. One relatively simple way of investigating social proof as an underlying mechanism is to select all behaviours from the meta-analysis that used a dichotomous outcome measurement and that were studied in a student sample, let students rate these behaviours on social proof and correlate these ratings with the data in the meta-analysis. If the correlation between social proof ratings and the experimental conditions of the comparisons in the meta-analysis were higher than the correlation between social proof ratings and the control conditions, this would be evidence that after predicting future behaviour, participants tend to act more in line with the social proof ratings. This method is used in the present study, and the hypothesis is that the correlation between social proof scores and the behaviour of the participants in the experimental conditions of the original studies is higher compared to the correlation between social proof scores and the behaviour of the participants in the control groups of the original studies.

9.2 Method

9.2.1 Participants

In total 37 participants took part in this study, 8 males and 27 females, 2 participants did not report their gender, M_{age} = 19.46, SD = 1.96. Participants were informed that they had the right to opt-out of taking part or to withdraw from the study at any time. The study was approved by the Faculty Research Ethics Committee (reference number FBL/15/03/30).

9.2.2 Materials

Social Proof Rating Questionnaire.

The questionnaire was created based on the studies included in the meta-analysis. Of all 55 comparisons in the meta-analysis, all studies that did not use a dichotomous outcome variable were removed. The remaining studies were coded for whether or not they used a student sample. Of the studies that used a student sample, all behaviours were selected that students in the UK could rate. Studies that were excluded at this stage focused, for example, on how likely students were to buy a new type of sweet that they saw in front of them (Van Kerckhove et al., 2011). After applying these selection criteria, 23 comparisons with a total of 11 different behaviours remained. These 11 behaviours were the basis for 11 items in the questionnaire. Each item consisted of a short explanation of the behaviour and setting and was followed by asking the participants to rate how many students in their university would perform this behaviour on an 11-point-scale ranging from 0-100% of the students. The social proof questionnaire can be found in Appendix IV.

9.2.3 Procedure

The data was collected as part of another project (Study 5). Students were asked to fill in a short questionnaire about behaviour. Before answering the questions, students were provided with a short information paragraph with instructions. This paragraph stated that students would be asked to estimate how many students in their university would perform a given behaviour. They were informed that there was no right or wrong answer and that the student should answer the question related to what students do in general and not answer the question in terms of what they themselves

would do. The participants then rated how many students would perform the 11 behaviours on an 11-point scale ranging from 0- 100% of the students.

9.2.4 Data-Analysis Strategy

After the participants had completed the questionnaire, the mean score (percentage of students performing a certain behaviour) of each of the 11 behaviours was calculated. In addition, the number of participants performing the behaviour in the control and experimental groups of the selected studies in the meta-analysis were transformed into percentages of participants performing the behaviour. These three variables (social proof ratings, control group behaviour percentages and experimental group behaviour percentages) were used to calculate the correlations between the social proof ratings and the percentages of the control and experimental groups of the meta-analysis studies that performed the behaviour (see Table 7 for an overview of these scores).

For clarity purposes, the correlation between the effect sizes of the studies in the meta-analysis and the social proof scores is also calculated. It seems intuitive that this correlation is informative as effect sizes are indicators of the strength of a found effect. However, when investigating social proof as underlying mechanism of the question-behaviour effect, this is not the case. The reason for this is the behaviour of the control group. In the control group, the behaviour can be performed by any percentage of participants between 0% and 100%. This means that the performance of the control group can be lower, at the same level, or higher than the social proof scores would suggest. If the question-behaviour effect nudges participants to behave in line with the social proof scores, this means that, in the experimental group, the behaviour can increase, decrease or stay the same. This means that regardless of

whether a control group is showing low, medium or high levels of behaviour performance, the effect size is hypothesised to be small if the behaviour of the control group is in line with the social proof scores. In addition, when the control group levels of behaviour performance are high, while the social proof scores are low or medium, an experimental group influenced by social proof scores will show lower levels of behavioural performance, resulting in a negative effect size. So if the question-behaviour effect influences people to behave in line with social proof perceptions, it is the behaviour of the control group, that is not subject to an influence attempt, that influences the direction and size of any found effect. For this reason, no correlation between the social proof scores and effect size of the original studies is expected.

Table 7. List of behaviours, source of the original data, percentages of participants in the control and prediction conditions performing the behaviour and the social proof scores obtained in the present study.

Behaviour	First author, Year, Study	Percentage control	Percentage prediction	Social proof score
Cheating on take-home exam	Spangenberg, 1996, Study 1	71.43%	48.72%	69.19%
Choosing unhealthy snack in a taste test	Williams, 2004, Study 3	76.81%	52.46%	72.43%
	Levav, 2006, Study 2	92.00%	65.22%	72.43%
Donating blood	Cioffi, 2011, Study 1	4.98%	5.67%	49.19%
	Van Dongen, 2013, Study 1	59.83%	61.23%	49.19%
	Van Dongen, 2013, Study 2	60.77%	62.39%	49.19%
Filling in questionnaire for cancer society	Spangenberg, 2003, Study 5	30.56%	52.00%	57.03%
Health club attendance	Spangenberg, 1997, Study 1	7.25%	12.33%	53.24%
	Spangenberg, 2003, Study 2	18.91%	20.65%	53.24%
Posting envelopes	Chapman, 2001, Study 2	8.04%	10.14%	47.57%
	Chapman, 2001, Study 2	8.04%	14.50%	47.57%
	Chapman, 2001, Study 2	8.04%	14.44%	47.57%
	Chapman, 2001, Study 2	8.04%	17.72%	47.57%
Signing up for health and fitness assessment	Sprott, 2003, Study 2	20.29%	38.24%	63.78%
	Sprott, 2004, Study 1	28.00%	54.24%	63.78%
	Sprott, 2004, Study 2	25.00%	35.00%	63.78%
	Sprott, 2004, Study 2	25.00%	52.46%	63.78%
	Spangenberg, 2006, Study 1	25.42%	46.88%	63.78%
Singing the national anthem over the telephone	Sherman, 1980, Study 2	66.67%	40.00%	31.08%
Taking part in a health and fitness assessment	Conner, 2011, Study 1	53.51%	68.34%	60.00%
Taking part in three studies in return for movie voucher	Van Kerckhove, 2009, Study 1	17.07%	21.43%	62.16%
Volunteering for the cancer society	Sherman, 1980, Study 3	4.35%	30.43%	48.92%
	Spangenberg, 2006, Study 2	28.57%	43.18%	48.92%

9.3 Results

As hypothesised, no correlation between social proof scores and effect size was found, $r(21) = -.03$, $p = .91$. There was a moderate, non-significant correlation between control group and social proof score, $r(21) = .34$, $p = .11$. There was a strong, significant correlation between the experimental group and social proof, $r(21) = .44$, $p = .04$. This correlation is higher than the correlation between the control group and

social proof score (r = .44 versus r = .34), and supports the hypothesis that participants in the prediction conditions in the studies in the meta-analysis behave more in line with social proof scores than the participants in the no-prediction control groups. Comparing the two correlations showed no significant difference between the control-social proof correlation and the experimental-social proof correlation, z = -0.37, p = .71.

9.4 Discussion

The results of this correlational study show that the behaviour in the experimental groups significantly correlates to the social proof ratings, while the behaviour in the control groups does not significantly correlate to the social proof ratings. Even though comparing the two correlations statistically does not result in a significant increase in correlation, the results support the hypothesis that participants change their behaviour in the direction predicted by social proof after being asked to predict their future behaviour. The non-significant difference is likely due to the relatively low sample size, as the unit of measurement was a published study instead of a participant. The findings are the first piece of evidence that shows that social proof might be an underlying mechanism of the question-behaviour effect. As this study is only correlational, future research should focus on using experimental methods to investigate the role of social proof further, as well as finding ways to compare this theory with other theories regarding the underlying mechanisms of the question-behaviour effect. Providing social proof primes before asking a prediction question could be a potential first step in this area.

9.5 General Discussion Study 1-4

In line with the second research question of this thesis, studies 1-4 set out to investigate the underlying mechanisms of the question-behaviour effect after the meta-analysis ruled out social desirable responding and publication bias as potential causes of the effect.

The results are mixed as some findings suggest cognitive dissonance drives the effect (i.e. Study 1B), while other findings imply attitude activation might cause the effect (i.e. Study 2), and some findings are not explained by either theory (i.e. Study 3). Social proof can explain these effects, and Study 4 suggests that social proof might be an underlying mechanism of the question-behaviour effect.

Studies 1-4 have some methodological limitations. A key limitation is that there is no measurement of changes in behaviour, only of changed recollection of past behaviour. Participants in the prediction conditions made a prediction and recalled past behaviour after a short filler task instead of having had the chance to change their behaviour and then self-report these changes. It is possible that recalling past behaviour without providing participants with the opportunity to change their actual behaviour is conceptually different from self-reported behavioural measurements after a longer time interval. To investigate the influence of asking questions on behaviour, it is important to move from recalling past behaviour after a short filler task, to measuring behaviour after a period of time in which participants had the chance to alter their behaviour.

In addition, while the meta-analysis showed that the question-behaviour effect occurs in both self-reported and objective measurements of behaviour, the underlying processes might not be the same. Therefore, to investigate the question-behaviour effect in a more meaningful way, the studies that follow use a future behaviour

prediction and use objective behavioural measurements to ensure that the changes in behaviour are not merely changes in questionnaire responses.

Since social proof and dissonance theory both rely on perceptions and cognitions, it is interesting to test other factors that are related to these theories in relation to the question-behaviour effect. The studies that follow will focus on investigating the moderating effects of self-affirmation and goal-difficulty on the question-behaviour effect. Self-affirmation is known to reduce dissonance (Steele & Liu, 1983). If social proof and dissonance processes underlie the question-behaviour effect, adding self-affirmation to a prediction question should affect the behavioural outcomes. Investigating self-affirmation and goal difficulty as moderators of question-behaviour effect is the goal of studies 5-7 in the following chapters and covers the third and last research question of this thesis, by investigating other factors that might moderate question-behaviour effects.

CHAPTER 10

STUDY 5: ATTENUATING EFFECTS OF SELF-AFFIRMATION

10.1 Introduction

The results of the meta-analysis showed some interesting moderators of the question-behaviour effect. For example, pro-self and commercial behaviours were influenced to a greater extent than other behaviours, and effect sizes were larger when behaviours were measured shortly after the intervention. However, all the moderators investigated in the meta-analysis were related to study characteristics, instead of adding tasks to the intervention.

Some of the studies included in the meta-analysis have investigated the effect of asking prediction questions in comparison with other types of interventions, such as implementation intentions (e.g. Godin et al., 2014). However, it would also be interesting to investigate how adding components to the question-behaviour effect intervention could enhance or attenuate the effect of asking prediction questions on behaviour. For example, if social proof and cognitive dissonance processes are related to the question-behaviour effect, adding a task designed to reduce dissonance should attenuate the effect of asking the predicting question. A task that is known to reduce feelings of dissonance is self-affirmation.

10.1.1 Self-Affirmation as a Way to Reduce Cognitive Dissonance

Self-affirmation is the process of reducing dissonance by casting the 'self' in a positive light through affirming an important aspect of the self-concept (Steele & Liu, 1983). Self-affirmation can reduce dissonance by providing an explanation of the divergence between attitudes and behaviour. If people perform a behaviour that is not

in line with their attitudes, but that is in line with their self-concept, they can use that concept to justify performing the counter attitudinal behaviour and reduce feelings of dissonance. In addition, self-affirmation can reduce defensive responding by affirming personal values (Griffin & Harris, 2011).

In research on risk-information, Correl, Spencer and Zanna (2004) found that a self-affirmation task does not increase the level of agreement with provided risk-information, but increases the attention of people towards argument strength and decreases biases about the topic. In other words, people are less likely to dismiss risk information because it is unwelcome, and self-affirmation induces a more open, neutral view when taking in the information about their risk behaviour. Their calibration hypothesis states that self-affirmation increases people's sensitivity towards personal relevant health-risk information. People with high-risk behaviour are more open to accept risk information after having completed a self-affirmation task, while people who do not engage in the high-risk behaviour are not negatively affected by the risk information. Other researchers found that people's defensiveness is reduced after completing a self-affirmation task (Haddock & Gebauer, 2011).

10.1.2 Self-Affirmation Methods

There are several methods to let people self-affirm. In the first studies on self-affirmation, participants were asked to write an essay about a personally (un)important value (e.g. D. A. K. Sherman, Nelson, & Steele, 2000, Study 2). Writing about the important value would make people feel better about themselves induce self-affirmation. This affirmation of the self would reduce dissonance. The downside of using these essays is that they require a great deal of cognitive effort and participants need to be willing to spend time answering this open-ended question.

Because of these limitations, other researchers have used questionnaires to make people self-affirm. Notably, research by Napper and colleagues (Napper, Harris, & Epton, 2009) used a questionnaire based on value research (Peterson & Seligman, 2004). They constructed a 32-item questionnaire that included questions such as "I value my ability to think critically" and "I am never too busy to help a friend" (Napper et al., 2009, p. 49). In addition to this questionnaire, they devised a matching control task. Instead of asking people to write an essay about an unimportant value, which has been used as control task before, they provided participants with the same set of questions as in the self-affirmation condition. However, instead of answering questions about themselves, they were asked to answer the questions in relation to a celebrity.

In addition to these methodological developments, other research has shown that for self-affirmation to reduce defensive responses to information, it is key that the self-affirmation task is offered before the participant is confronted with the risk information (Critcher, Dunning, & Armor, 2010). Critcher et al. suggest that the only exception to this rule is when the participant has not yet made up his/her mind after being exposed to the risk information. As it is difficult to predict how long it takes for people to make a decision, it is safer to design interventions in which self-affirmation is achieved before confronting people with information about their risk behaviour.

10.1.3 Self-Affirmation in an Intervention Setting

Self-affirmation has been used in different intervention settings and for different purposes. For example, self-affirmation has been used to stimulate fruit and vegetable consumption (Epton & Harris, 2008), reduce alcohol consumption among female adolescents (Ferrer, Shmueli, Bergman, Harris, & Klein, 2011), increase

sunscreen use (Jessop, Simmonds, & Sparks, 2009) and to increase acceptance of health information about the risk of developing diseases from drinking coffee or having unprotected sex (D. A. K. Sherman et al., 2000).

10.1.4 Self-Affirmation and the Question-Behaviour Effect

If dissonance between prediction and past behaviour plays any role in question-behaviour effect research, it should be possible to influence the outcome of question-behaviour effect interventions by adding a self-affirmation task. If a self-affirmation task is added after the prediction question, this should attenuate the effect that predicting future behaviour has on subsequent behaviour. This is interesting, as self-affirmation might be able to reverse unwanted effects from asking people to predict their future behaviour. This is relevant when investigating intentions towards vice behaviours without wanting to affect these behaviours in the future. Such research would benefit from adding a task that could reduce the influence of the questions they wish to ask on future behaviour.

While self-affirmation has been applied in a wide variety of interventions, only one study on the link between self-affirmation and the question-behaviour effect has been conducted (Spangenberg et al., 2003). Their hypothesis was that self-affirmation could attenuate question-behaviour effects. More specifically, they investigated how adding a self-affirmation task to a web-based questionnaire would influence participants' willingness to fill in a survey for the cancer society, after being exposed to an advertisement stating "Ask yourself: Will you support the American Cancer Society?" (Spangenberg et al., 2003, p. 57). They found that asking a predication question increased the percentage of people filling in the cancer society survey from 30.6% to 52.0%. However, adding the self-affirmation task to the

questionnaire after the prediction question reduced the percentage of people filling in the cancer society survey to 18.2%. This was even lower than the 30.6% score in the control group. However, there are several reasons why conducting a new study on the link between self-affirmation and the question-behaviour effect is important. While the results seem promising, their self-affirmation task used a control task that might be substantially different from the goal of the self-affirmation task. In both conditions, participants were asked to rank a list of 11 traits in terms of whether it was important to them or not. The participants in the experimental self-affirmation conditions were then asked to write a short essay about why their most important trait was important to them, while the participants in the control condition were instructed to write why their ninth most important trait might be important to others. Since writing essays might be more error prone and result in 'messy' data, using a more structured questionnaire as suggested by Napper, Harris and Epton (2009) will improve the validity of the findings of a study investigating self-affirmation in relation to the question-behaviour effect.

In addition, while the authors do not state how many participants they started with, they excluded participants from the study if they did not meet certain criteria regarding completing the self-affirmation task and other checks and as a result "[m]any participants did not make the cut at several of these stages" (Spangenberg et al. 2003, p. 58), resulting in questions about the reliability of their findings.

Lastly, it is interesting to investigate the moderating effect of self-affirmation in question-behaviour effect research regarding a different type of behaviour. Spangenberg's study focused on an altruistic behaviour, as the participants would not benefit from filling in the cancer society survey. As the meta-analysis showed, question-behaviour effects are smaller when the focal behaviour is concerning others

compared to a personally relevant behaviour. The question whether or not adding a self-affirmation task to a prediction question that is related to personal benefits would show the same effect is key in the present study.

10.1.5 The Present Study

The focal behaviour in the present study is eating 'five-a-day', a guideline for daily fruit and vegetable intake meaning that eating five portions of fruit and vegetables each day fits into a healthy lifestyle. In the current study, participants were asked to predict whether or not they will eat five-a-day as part of their eating behaviour. In addition, some participants were be asked to complete a self-affirmation task. After completing the questionnaire, all participants received a voucher to collect a free bowl of fruit or vegetables at the fruit and vegetable stand in the main hall of the university. The hypothesis is that asking a prediction question regarding eating five-a-day will increase the number of participants that will collect the free fruit or vegetables compared to a control group that is not asked a prediction question. In addition, it is hypothesised that the participants who are asked to make a prediction and complete a self-affirmation task afterwards are less likely to redeem their voucher compared to the prediction only group, thereby attenuating the effect of asking prediction questions on behaviour.

10.2 Method

10.2.1 Design

The present study used a 3-group (Control, Prediction, Prediction plus self-affirmation) between-subjects design plus attitude measurement condition with random allocation of participants to conditions.

10.2.2 Participants

In total, 143 students took part in this study, 52 male, 87 female and 4 unknown, M_{age} = 19.79, SD = 2.76. The students were asked to fill in a short questionnaire at the start of an introduction lecture. Students were told that the questionnaire was about their behaviour and that all their responses would be recorded anonymously. They had the right to opt-out of taking part or to withdraw from the study at any given time. Apart from a voucher to collect free fruit or vegetables at the fruit and vegetables stand in the main hall, participants did not receive an incentive to take part in the study. After distributing the questionnaires, a total of 143 completed questionnaires were returned. After counting all questionnaires, 25 questionnaires were missing. These questionnaires and the corresponding vouchers were removed from the sample because there was no way of gauging whether the participants had completed the questionnaire or not. Any blank questionnaires that were returned without the voucher attached were added to the control condition as no experimental task was completed. The study was approved by the Faculty Research Ethics Committee (reference number FBL/15/03/30).

10.2.3 Materials

Free Fruit or Vegetables Voucher.

Students received a voucher that they could redeem for free fruit or vegetables at the fruit and vegetable stand in the main hall of the campus. This voucher stated that they could only use the voucher on the same day and that only one voucher per person would be redeemable. A unique code was printed on each voucher with another unique code printed on the questionnaire. This way, the redeemed vouchers could be linked to specific questionnaires and conditions. One voucher was worth a

bowl of fruit or vegetables that participants could choose themselves. Examples of the contents of such a bowl are five apples, four oranges or three peppers and normally one bowl would cost £1, -. An example of this voucher can be found in Appendix IX.

Self-Affirmation Task.

For this study, the self-affirmation task designed by Napper and colleagues was used (Napper et al., 2009). This task consists of 32 statements where participants have to answer to which extent the statement is like them on a 5-point scale. This self-affirmation task can be found in Appendix VIII. In addition to the self-affirmation task, Napper and colleagues designed a control task that is very similar to this self-affirmation questionnaire. In the control task, the same 32 questions are asked, but this time the participants have to answer the questions as if they are rating a celebrity that most, if not all, participants will have heard of. In the present study, participants rated the celebrity Kim Kardashian. Since it was likely that the sample of students taking part in this study would include a large number of international students, a world-known celebrity was chosen. In the conditions where the self-affirmation task was focused on Kim Kardashian, an additional question about how much they liked her was added at the end of the self-affirmation task to check whether she was a relatively neutral choice of celebrity. This self-affirmation control task can be found in Appendix VII.

10.2.4 Procedure

Participants were assigned randomly to one of the four conditions. The participants in the two prediction conditions read a short informative text about what eating five-a-day means and were given some examples about what counts as a portion. This information can be found in Appendix VI. This text was followed by a

prediction question regarding eating five-a-day in the future: “Do you predict that you will eat enough portions of fruit and vegetables this week to reach your 5-a-day?”. After the prediction question, both prediction conditions received a self-affirmation questionnaire. Participants in the prediction condition received the questionnaire regarding Kim Kardashian, while participants in the prediction plus self-affirmation condition were asked to rate the statements about themselves instead. On the last page of the questionnaire, participants found a voucher for a free bowl of fruit or vegetables. They were asked to remove the voucher from the questionnaire and hand in the questionnaire while keeping the voucher. The number of vouchers redeemed at the fruit and vegetable stand at the end of the day in each condition served as dependent variable.

Participants in the no-prediction condition served as control group and were asked four social proof questions about Study 1-3, which were not analysed, before completing the control version of the self-affirmation task and finding the free fruit or vegetables voucher. Participants in the attitude condition completed nine questions to investigate how students’ opinions about eating five-a-day. These questions can be found in Appendix V. The second part of their questionnaire consisted of the questions described in Study 4. The participants in this condition served as sample for Study 4 as well as sample for the attitude questions in the present study. After completing the questionnaire, they also received the free fruit or vegetables voucher, to ensure that all participants received the same reward for taking part in the classroom study (see Figure 13 for an overview of the procedure).

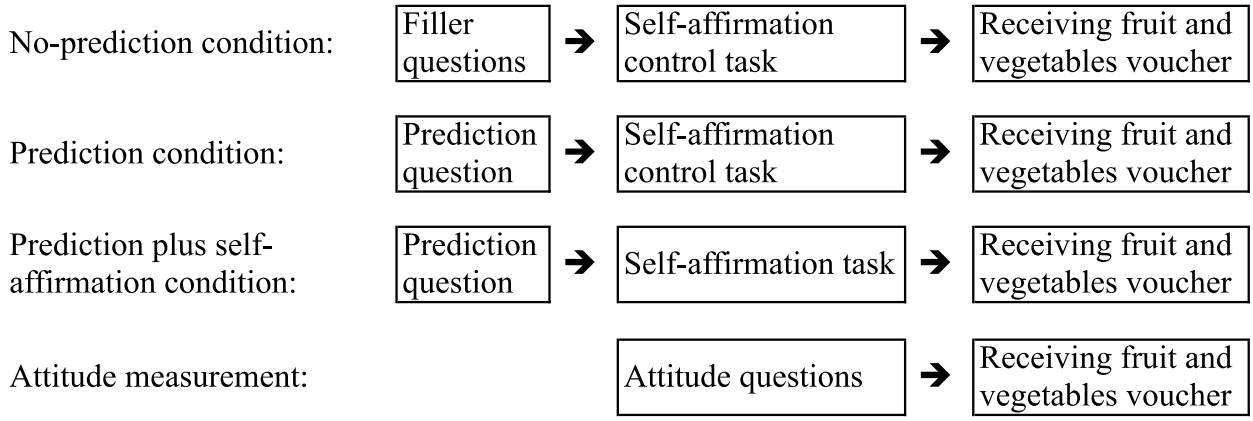

Figure 13. Flowchart of the procedure used in Study 5.

10.3 Results

10.3.1 Attitude Measurements

The 37 participants in the attitude condition answered nine questions related to their views about eating fruit and vegetables on a 7-point Likert scale. Overall, participants were positive about eating fruit and vegetables, stating that they like the taste of fruit and/or vegetables (M = 5.98, SD = 1.38), agreeing that eating those products is pleasant (M = 5.65, SD = 1.21) and healthy (M = 6.27, SD = 1.12). In addition, they agree that it is important to eat enough fruit and vegetables (M = 5.97, SD = 1.24) and that they eat fruit and vegetables to stay healthy (M = 5.16, SD = 1.88). Students also reported that they were able to eat fruit and vegetables, given the relatively high scores on items "Eating enough fruit and vegetables fits into my eating habits" (M = 5.14, SD = 1.44) and "Fruit and vegetables are easy to prepare" (M = 5.49, SD = 1.39). Regarding costs, the participants slightly agreed with "Eating enough fruit and vegetables costs a lot of money" (M = 4.43, SD = 1.89) and "I don't eat enough fruit and vegetables when I'm low on money" (M = 4.41, SD = 2.13).

10.3.2 Manipulation Check

To ascertain that participants felt neutral towards the chosen celebrity, the mean, standard deviation, mode and median of the opinion question were calculated. The celebrity received neutral ratings on a 7-point scale from the participants (M = 3.89, SD = 1.82, $Median$ = 4, $Mode$ = 4).

10.3.3 Question-Behaviour Effect Findings

In the two prediction conditions (prediction and prediction plus self-affirmation), 41.3% of the participants (31/75) predicted they would eat five-a-day in the future. The number of participants saying they would do so did not differ significantly across the two prediction conditions, $\chi^2(1) = 2.07$, $p = .15$.

A Chi-square test on number of used vouchers showed a significant effect of condition on number of vouchers used, $\chi^2(2) = 8.46$, $p = .02$. Pairwise comparisons show a large reduction in voucher use in the prediction group compared to the control group, $\chi^2(1) = 8.17$, $p < .01$, $RR = 0.38$, 95% CI [0.18, 0.78], the opposite of what was hypothesised, namely that asking the prediction question would increase instead of decrease voucher use. In addition, there was a large increase in voucher use in the self-affirmation group compared to the prediction group, $\chi^2(1) = 4.55$, $p = .03$, RR = 2.13, 95% CI [1.01, 4.49], and no meaningful difference between the control and self-affirmation groups, $\chi^2(1) = 0.85$, $p = .36$, $RR = 0.80$, 95% CI [0.50, 1.28]. This supports the second part of the hypothesis, that adding self-affirmation to the prediction question would attenuate the question-behaviour effect (see Table 8 and Figure 14).

Table 8. Number of participants answering 'yes' on the prediction question, numbers and percentages of vouchers used and group sizes.

	Participants predicting 'yes'	Number of vouchers used	Percentage used	N
Control	-	17	54.8%	31
Prediction	11	7	20.6%	34
Prediction plus self-affirmation	20	18	43.9%	41

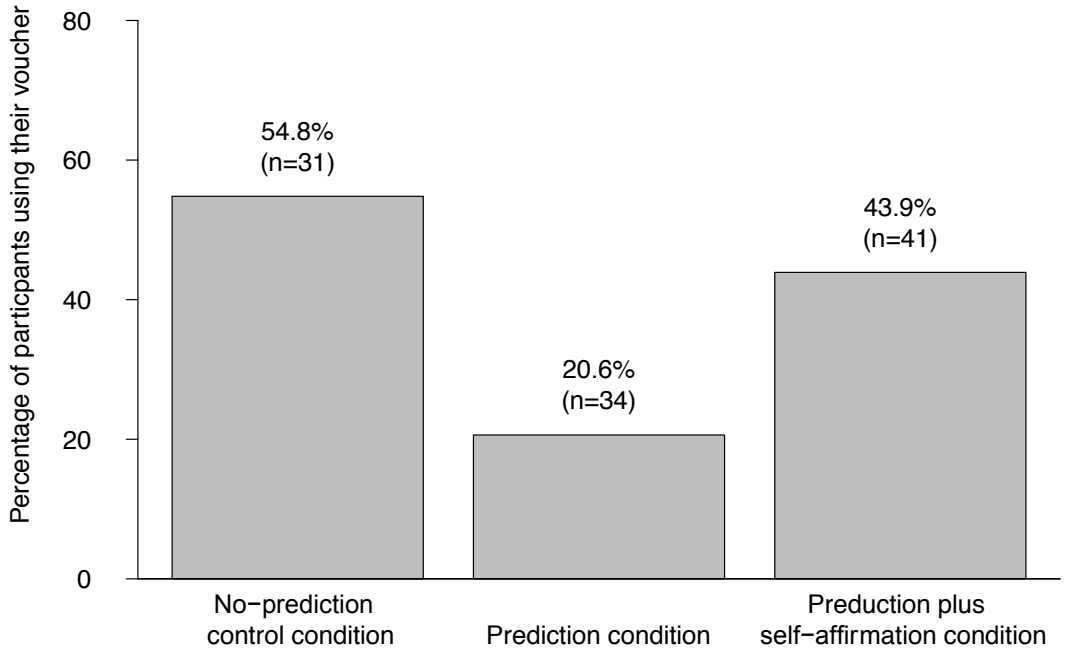

Figure 14. Voucher use per condition in percentages.

10.4 Discussion

10.4.1 Summary of the Findings

The results show that people who are asked to predict whether they will eat five-a-day are *less* likely to use a voucher for free fruit or vegetables. This effect is attenuated when the prediction question is accompanied by a self-affirmation task. While the self-affirmation task attenuates the question-behaviour effect as predicted, the effect of predicting to eat five-a-day was in the opposite direct of the hypothesis.

Participants were less likely instead of more likely to redeem their voucher after predicting their five-a-day behaviour. While this is unexpected, it is in line with how the participants answered the prediction question. The majority of participants predicted that they would not eat five-a-day in the future.

10.4.2 Explanation of the Findings

The answers to the attitude questions showed that the participants believed eating fruit and vegetables to be a good thing and while they also agreed that money issues might prevent them from eating fruit and vegetables, this does not explain why fewer vouchers were used by participants in the prediction only group. If the conclusion of Study 4 that the question-behaviour effect is related to social proof is correct, this might explain the findings of the present study. The perception of students might be that most other students do not reach the goal of eating five-a-day which causes them to answer "no" on the prediction question. A somewhat similar explanation is that students might believe that eating five-a-day is an unreachable goal and that their perception of what other students do strengthens this belief. In this case, the effect might be explained by a form of self-handicapping (Berglas & Jones, 1978; Jones & Berglas, 1978), the concept that people behave in a negative way so they have an excuse in case they fail to reach their goal. Greenberg (1985) showed that setting an unattainable goal was used as a self-handicapping technique so that the participants would not perceive themselves as failed when they were not able to reach this goal. If eating five-a-day is considered an unattainable goal, participants might not just have given up on reaching the goal, but might have self-handicapped by not collecting their free fruit and vegetables.

A methodological explanation of the findings is related to the number of participants predicting they would eat five-a-day. The difference in percentage of participants saying "yes" to the prediction question did not significantly differ between the two prediction conditions. However, the percentage of participants in the prediction plus self-affirmation condition predicting they would eat five-a-day was 48.8% while 32.4% of the participants in the prediction only condition predicted they would eat five-a-day. Since the prediction question came before the self-affirmation task, the responses to the predictions should be roughly the same. The question then becomes whether this (non-significant) difference has caused the negative effect of asking to predict eating five-a-day on voucher use.

10.4.3 Self-Affirmation as Attenuating Factor in the Question-Behaviour Effect

The effect of self-affirmation on voucher use is interesting. Instead of reducing the likelihood of performing a behaviour, as was the case in the study by Spangenberg and colleagues (2003), the question-behaviour effect is attenuated by an increase in voucher use in the present study. One explanation might be that as the percentages of participants stating they would eat five-a-day were low, the self-affirmation task might have increased participants' belief that they can reach the five-a-day goal, thereby increasing the chance that participants would use the voucher. If this is the case, adding a self-affirmation task to a question-behaviour effect study before, instead of after, asking participants to make a prediction might result in an increase of participants stating they will eat five-a-day and also increase the number of vouchers that are handed in. In contrast, if eating five-a-day is seen as an unattainable goal, and this perception is enhanced by participants' perception of the behaviour of peers, a more general question related to fruit and vegetable

consumption could lead to an increase in voucher use, which could then be attenuated by adding a self-affirmation task. For example, asking participants whether they will predict to eat fruit and vegetables in general, instead of having to comply with a specific amount such as five-a-day could result in more participants predicting they would do so. Investigating whether adding a self-affirmation task after an easy prediction question attenuates the effect in the same way as in the cancer society study by Spangenberg et al. (2003) could provide insights in how and when to add a self-affirmation task to an intervention to attenuate unwanted question-behaviour effects. Studying the effect of adding self-affirmation before the prediction question as well as studying the effect of using a more general prediction question is the focus of studies 6 and 7.

CHAPTER 11

STUDY 6: SELF-AFFIRMATION REPLICATION STUDY

11.1 Introduction

Study 5 showed that adding a self-affirmation task to a question-behaviour effect intervention can attenuate the effects of the prediction question. However, contrary to the hypothesis, participants who were asked to predict whether they would eat five-a-day were less likely instead of more likely to use their free fruit or vegetables voucher compared to participants who did not receive a prediction question. To investigate this further, a second study using the same paradigm and design was conducted. This study served to investigate the possible alternative explanation of the findings in Study 5 that the difference in participants answering yes between the two experimental conditions caused the lower voucher use. Since both conditions were similar until after the participants had made their prediction, more similar percentages of participants predicting they would eat five-a-day were expected. To rule out this difference between the experimental conditions as cause of the drop in voucher use in the prediction only condition, the present study is designed to replicate Study 5.

In addition, since the self-affirmation task attenuated the effect of the prediction question by increasing the chance of participants using their voucher, this effect is further investigated in the present study. The question is whether putting the self-affirmation task before instead of after the prediction question could lead to an increase in participants predicting they will eat five-a-day as well as an increase in voucher use. To investigate these two questions, the three-condition design of Study 5 was used with an additional fourth condition in which the self-affirmation task was

presented before the participants completed the prediction question. The hypothesis is that asking participants to predict their eating five-a-day behaviour will result in less redeemed vouchers compared to the control group. In addition, it is hypothesised that the effect of the prediction question will be attenuated by the self-affirmation task and that the condition that completes the self-affirmation task before answering the prediction question will show a higher percentage of participants predicting to eat five-a-day and redeeming their voucher compared to the no-prediction condition.

11.2 Method

11.2.1 Design

The present study used a 4 group (Control, Prediction only, Prediction plus self-affirmation, Self-affirmation plus prediction) between-subjects design with random allocation of participants to conditions.

11.2.2 Participants

In total, 138 students took part in this study, 49 male, 70 female and 19 unknown, M_{age} = 20.87, SD = 1.84. The students were asked to fill in a short questionnaire in a classroom setting. Students were told that the questionnaire was about their behaviour and that all their responses would be recorded anonymously. They had the right to opt-out of taking part or to withdraw from the study at any time. Apart from a voucher to collect free fruit or vegetables at the fruit and vegetables stand in the main hall, participants did not receive an incentive to take part in the study. The study was approved by the Faculty Research Ethics Committee (reference number FBL/14/10/07).

11.2.3 Materials

Free Fruit or Vegetables Voucher.

Like the previous study, participants received a voucher that they could redeem for a bowl of free fruit or vegetables at the fruit and vegetable stand in the main hall of the campus on the same day. A unique code was printed on each voucher so the voucher could be linked to a specific questionnaire and condition.

Self-Affirmation Task.

The self-affirmation task used in Study 5 was also used in the present study. As the results of Study 5 showed, the participants that received the self-affirmation control task were neutral in their opinion about Kim Kardashian, so she was also the celebrity rated in the self-affirmation control task in the present study.

11.2.4 Procedure

Participants were assigned randomly to one of the four conditions. The control, prediction only and prediction plus self-affirmation conditions were similar to those of Study 5, with the addition of a short filler task at the beginning of the questionnaire. This filler task was similar to the filler task in studies 1-3 where participants had to underline a certain digit every time it occurred in a matrix of single digits. The fourth condition, self-affirmation plus prediction condition started with the self-affirmation task followed by the prediction question. The prediction question used in this study was similar to the one used in Study 5, which was "Do you predict that you will eat enough portions of fruit and vegetables this week to reach your 5-a-day?" To reduce the likelihood of participants understanding that the voucher was related to the prediction question, the short filler task used in the other conditions was added after the prediction question in this condition. On the page after the filler task

the participants found a voucher that they could use to get a free bowl of fruit or vegetables. They were asked to remove the voucher from the questionnaire and hand in the questionnaire while keeping the voucher. The number of vouchers used in each condition serves as dependent variable (see Figure 15 for an overview of the procedure).

Similar to Study 5, participants were excluded form the analysis if they did not return the questionnaire. Participants who returned empty questionnaires without the voucher attached were added to the control group, as they did not complete any of the experimental tasks.

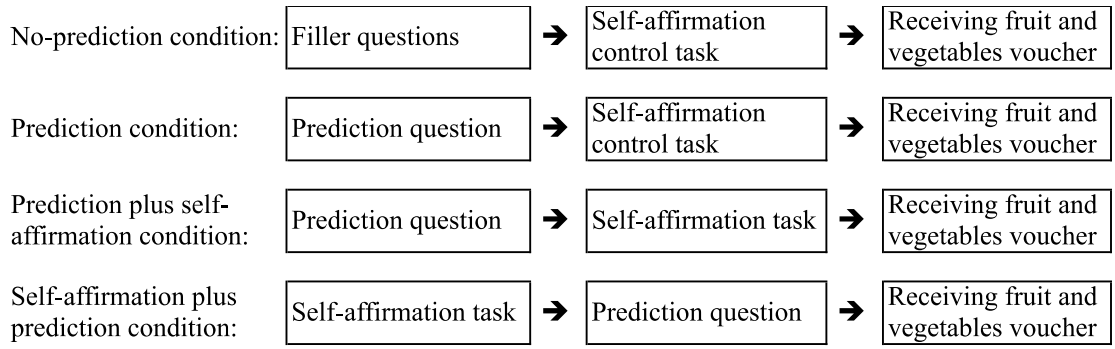

Figure 15. Flowchart of the procedure used in Study 6.

11.3 Results

11.3.1 Manipulation Check

As in the previous study, the chosen celebrity received a neutral rating by the participants on a seven-point scale ($M = 3.80$, $SD = 1.70$, $Median = 4$, $Mode = 4$).

11.3.2 Question-Behaviour Effects

In the three prediction conditions, 41.5% of the participants (39/94) who answered the prediction question, predicted they would eat five-a-day in the future.

The number of participants saying they would do so did not differ significantly across the three prediction conditions, $\chi^2(2) = 0.18$, $p = .92$. The hypothesis that adding self-affirmation before the prediction question would lead to more participants predicting they would eat five-a-day is not supported.

There was no significant effect of condition on number of vouchers used, $\chi^2(3) = 3.88$, $p = .28$. While the percentage of participants using their voucher is lower in the prediction only condition compared to the control condition as hypothesised (51.5% versus 72.1%), this was only a small effect, $\chi^2(1) = 3.40$, $p = .07$, $RR = 0.71$, 95% CI [0.49, 1.04]. A small effect was found between the prediction only and prediction plus self-affirmation conditions, $\chi^2(1) = 0.65$, $p = .42$, $RR = 1.19$, 95% CI [0.78, 1.81], and the control and prediction plus self-affirmation conditions, $\chi^2(1) = 1.07$, $p = .30$, $RR = 0.85$, 95% CI [0.62, 1.17]. Even though the effects were small, the directions of the effects are similar to those of Study 5 (lower voucher uptake in the prediction only condition compared to the control condition and an attenuated effect when adding self-affirmation to the prediction question).

The hypothesis that adding self-affirmation before the prediction question could positively influence the effects of the intervention was not supported. The chi-square test on voucher use for the 'self-affirmation plus prediction condition' and the 'prediction plus self-affirmation condition' was not significant, $\chi^2(1) = 0.44$, $p = .51$, $RR = 1.13$, 95% CI [0.79, 1.63]. The number of vouchers used in each condition can be found in Table 9 and Figure 16.

Table 9. Number of participants answering 'yes' on the prediction question, numbers and percentages of vouchers used and group sizes per condition.

	Participants predicting 'yes'	Number of vouchers used	Percentage used	N
No-prediction condition	-	31	72.1%	43
Prediction only	14	17	51.5%	33
Prediction plus self-affirmation	14	22	62.9%	35
Self-affirmation plus prediction	11	18	69.2%	26

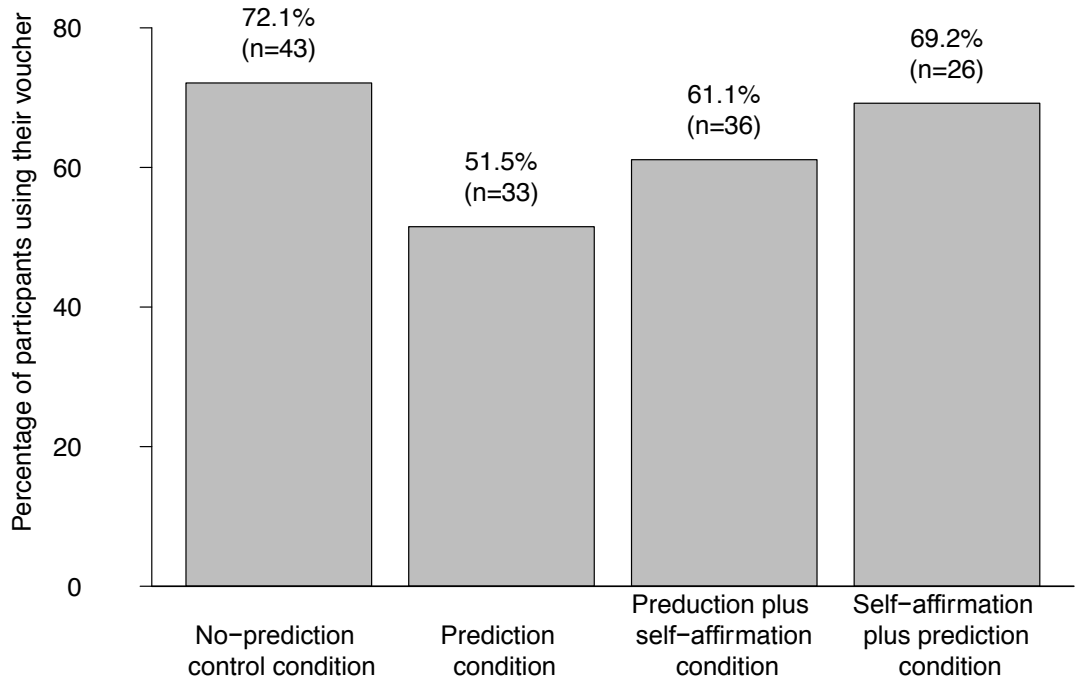

Figure 16. Voucher use per condition in percentages.

11.4 Discussion

11.4.1 Summary of the Findings

While the direction of the effect is similar to the findings of Study 5, the effects are small instead of large as was the case in Study 5. Compared to Study 5, the percentages of participants predicting to eat five-a-day were more similar across conditions, with percentages ranging between 38.9% and 44.0%. This means a

difference in prediction answers as influencing factor for the direction of the effect can be ruled out. Together with the finding that the number of participants answering "yes" to the prediction question did not differ significantly across conditions, this also means that putting the self-affirmation task before instead of after the prediction question does not significantly increase the number of participants predicting they will eat five-a-day or redeeming their voucher. The data show a small negative effect of the prediction question on voucher use compared to the no-prediction control condition. While this effect is not as large as in Study 5, the effect is in the same direction, a drop in voucher use after being asked to predict eating five-a-day. The question remains why participants who are asked to predict eating five-a-day are less likely to use a free fruit or vegetables voucher compared to a no-prediction condition. As Study 5 showed, students rated eating fruit and vegetables as positive, by stating that it is healthy, important and pleasant to eat fruit and vegetables.

11.4.2 Explanation of the Findings

The explanation behind the drop in voucher use might be related to unattainable goals. Previous research has shown that setting an unattainable goal can be a strategy to enhance self-handicapping (Greenberg, 1985). Since the goal was, implicitly, set by the way the question was framed, participants could have perceived this goal as unattainable and have given up on achieving the goal. They might have convinced themselves that even though they predicted to eat five-a-day, this goal was set so high that they could not achieve it. In addition, models on goal-setting suggest that other factors such as task complexity and other peoples' goals and past success influence the chance of people reaching their goal (Hollenbeck & Klein, 1987). If students think that their peers do not eat five-a-day and they see eating five-a-day as a

complex behaviour that is difficult to fit into their eating patterns, this would explain a drop in use of the voucher as they might refrain from setting the goal of eating five-a-day. Other research shows that goals that were set by participants themselves and that they commit to publicly are more likely to be met in comparison to assigned, private goals (Hollenbeck, Williams, Klein, Variables, & Goal, 1989). This could mean that a prediction question regarding eating fruit and vegetables could be more successful if participants would have set the goal themselves, instead of being asked about eating a specific number of portions of fruit and vegetables.

As mentioned in Study 5, adding self-affirmation to risk-information can increase peoples' openness towards this type of information (Haddock & Gebauer, 2011). When participants read about eating five-a-day before predicting whether or not they will eat five-a-day in the future, they might turn defensive when realising they are not meeting the goal of eating five-a-day. If the discrepancy between their actual behaviour and the five-a-day norm is large, eating five-a-day can be perceived as an unattainable goal so that even while they know they should eat more fruit and vegetables, they are reluctant to change. With the addition of self-affirmation, this defensiveness might be reduced, explaining the attenuated effects found in the self-affirmation conditions in Study 5 and 6.

To investigate this explanation of the findings in these two studies, a new study is designed to investigate the effects of goal-difficulty and self-affirmation on question-behaviour effects. In this study, an easy obtainable goal, "eating fruit and vegetables" is tested in comparison with the goal of Study 5 and 6 of eating five-a-day. As this new goal is more vague and less demanding than the goals of the previous two studies, asking participants to predict whether they would eat fruit and vegetables should lead to an increase in voucher use.

CHAPTER 12

STUDY 7: EASY-GOAL VS. HARD-GOAL PREDICTION

12.1 Introduction

Study 6 showed that there was no moderating effect of adding self-affirmation to a question-behaviour effect intervention prior to the prediction question compared to adding the self-affirmation task after the prediction question. In both Study 5 and Study 6, the participants in the prediction only condition were less likely to redeem their free fruit or vegetables voucher, but this effect was only significant in Study 5.

In the present study, the explanation that the goal might be perceived as unattainable is investigated. Since there was no significant difference between number of people predicting they would eat five-a-day in the groups that first received the self-affirmation questionnaire or the prediction question, the self-affirmation plus prediction question condition is dropped and two other conditions are added: an easy-goal prediction condition and an easy-goal prediction plus self-affirmation condition.

In these easy goal conditions, participants are asked to predict whether or not they will eat fruit and vegetables this week. This goal does not specify a number of portions and therefore can be seen as a more basic version of the five-a-day goal. As it is impossible to eat five-a-day for a week without also reaching the goal of 'eating fruit and vegetables this week', the latter can be seen as an easier goal in comparison to the five-a-day goal and one that more people are likely to achieve.

If the goal of eating five-a-day was perceived as too hard, the participants in the easy goal prediction condition should show an increase in voucher use compared to the control group and to the hard-goal (eating five-a-day) prediction conditions.

The hypothesis is that for the conditions that are similar to Study 5 and 6 (no-prediction, hard-goal prediction and hard-goal prediction plus self-affirmation), the effects will be similar to those in the aforementioned studies. So, a decrease in voucher use in the hard-goal prediction condition compared to the no-prediction condition is hypothesised, as well as an attenuated effect of the prediction question on voucher use in the hard-goal prediction condition plus self-affirmation. In addition, it is hypothesised that compared to the hard-goal prediction condition, the easy-goal prediction will show an increased number of vouchers used, an effect that is predicted to be attenuated in the easy-goal prediction plus self-affirmation condition.

12.2 Method

12.2.1 Design

The present study used a 2 (Type of goal prediction: easy vs. hard) * 2 (Self-affirmation: yes vs. no) between-subjects design plus control group. Participants were assigned randomly to one of the five conditions.

12.2.2 Participants

In total, 157 students took part in this study, 76 male, 72 female and 9 unknown, M_{age} = 19.63, SD = 2.07. In line with Study 5 and 6, the students were asked to fill in a short questionnaire in a classroom setting. Students were told that the questionnaire was about their behaviour and that all their responses would be recorded anonymously. They had the right to opt-out of taking part or to withdraw from the study at any time. Apart from a voucher to collect free fruit or vegetables at the fruit and vegetables stand in the main hall, participants did not receive an

incentive to take part in the study. The study was approved by the Faculty Research Ethics Committee (reference number FBL/14/10/07).

12.2.3 Materials

Free Fruit or Vegetables Voucher.

In the present study, the same voucher as used in Study 5 and 6 was offered to participants. They could redeem the voucher for a free bowl of fruit or vegetables at the fruit and vegetable stand in the main hall of the campus on the same day. A unique code was printed on each voucher so the voucher could be linked to a specific questionnaire and condition.

Self-Affirmation Task.

The same self-affirmation task that was used in study 5 and 6 was used in the present study. The results of Study 6 replicated the finding in Study 5 that participants who received the self-affirmation control task were fairly neutral in their opinion about Kim Kardashian, so she was also the celebrity rated in the present study.

12.2.4 Procedure

The design and procedure of the present study are similar to those of Study 5, with the addition of two new, easy-goal, prediction groups (with and without self-affirmation). Participants were assigned randomly to one of the five conditions. The control condition completed four filler questions while the participants in the prediction conditions completed either an easy-goal prediction question, “Do you predict that you will eat fruit and vegetables this week?” or a hard-goal prediction question, “Do you predict that you will eat enough portions of fruit and vegetables this week to reach your 5-a-day?” which was similar to the prediction question in

studies 5 and 6. After this, the control and prediction only conditions completed the self-affirmation control task in which they answered self-affirmation questions about a celebrity. In the prediction plus self-affirmation conditions, the participants completed the self-affirmation questionnaire.

The last page was similar in all conditions. There, the participants found a voucher that they could use to get a free bowl of fruit or vegetables at the fruit and vegetable stand in the main hall of the campus on the same day. They were asked to remove the voucher from the questionnaire and return the questionnaire while keeping the voucher. The number of vouchers used in each condition serves as dependent variable (see Figure 17 for an overview of the procedure).

Like in Study 5 and 6, vouchers of participants who did not return the questionnaire were excluded from the analysis and returned blank questionnaires without the voucher attached were added to the control group as participants did not complete any of the experimental tasks.

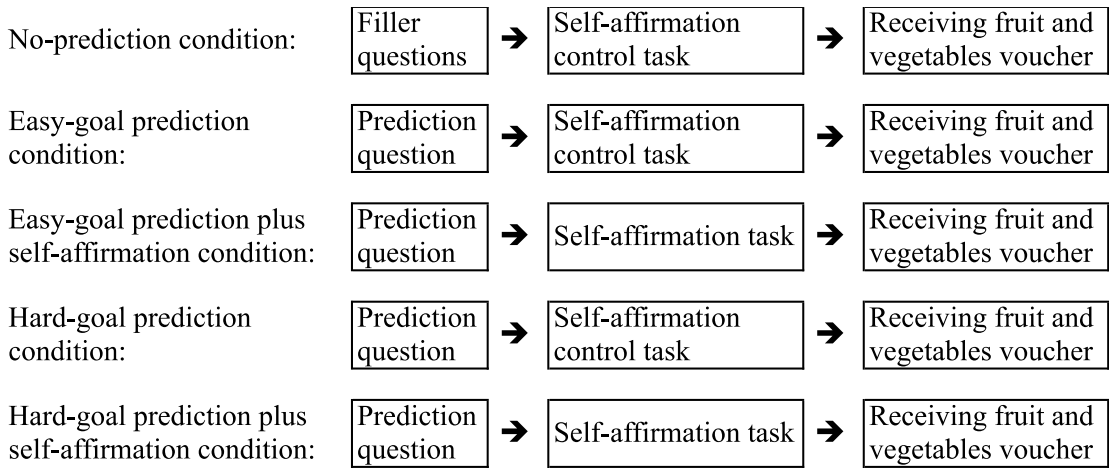

Figure 17. Flowchart of the procedure used in Study 7.

12.2.5 Meta-Analytic Approach to Studies 5-7

Since studies 5-7 all use the same prediction question regarding eating five-a-day in one of the conditions, a fixed-effects model can be applied to this data to investigate the overall findings of asking participants about eating five-a-day compared to not asking a prediction question on number of vouchers redeemed. In a similar manner, the overall effect of adding self-affirmation to a prediction question can be calculated. The hypothesis is that combining the findings of studies 5-7 will result in a lower number of vouchers used in the prediction condition compared to the no-prediction condition and that this effect is attenuated in the prediction plus self-affirmation condition.

12.3 Results

12.3.1 Manipulation Checks

The first manipulation check involved measuring whether the chosen celebrity was considered a neutral choice. As in the two previous studies, the chosen celebrity received a relatively neutral rating by the participants on a seven-point scale (M =3.52, SD = 1.62, $Median$ = 4, $Mode$ = 4).

The second manipulation check involved testing whether the participants in the easy-goal conditions were more likely to make a positive prediction (answer they would behave in line with the prediction question) compared to the participants in the hard-goal conditions. In the four prediction conditions (easy goal prediction only, easy goal prediction plus self-affirmation, hard goal prediction only and hard goal prediction plus self-affirmation), 60.2% of the participants (74/123) who answered the prediction question, predicted they would eat fruit and vegetables or five-a-day in the future. The number of participants saying they would do so was significantly higher

in the easy goal conditions compared to the hard goal conditions, $\chi^2(1) = 52.66$, $p < .001$. Closer inspection showed that there were no significant differences between the easy-goal prediction only and easy-goal self-affirmation condition, $\chi^2(1) = 2.67$, $p = .10$. The same non-significant result was found for the hard-goal conditions, $\chi^2(1) = 2.27$, $p = .13$.

12.3.2 Question-Behaviour Effects

There was no significant effect of condition on number of vouchers used, $\chi^2(4) = 5.82$, $p = .21$. While the effects are in the hypothesised direction (see Table 10 and Figure 18), the overall effect is not strong enough to result in a statistically significant replication of Study 5 and 6. Closer inspection through pairwise comparisons shows a medium sized positive effect between the easy goal-prediction condition and the no-prediction control condition, $\chi^2(1) = 2.93$, $p = .087$, $RR = 1.43$, 95% CI [0.95, 2.15], indicating that asking an easy-goal prediction question could increase rather than decrease voucher use compared to a control group that is not asked to predict their future behaviour. In addition, a large effect was found between the easy-goal prediction condition and the hard-goal prediction condition, $\chi^2(1) = 4.66$, $p = .03$, $RR = 1.65$, 95% CI [1.03, 2.64], which is in line with the hypothesis that the participants in the easy-goal prediction condition would be more likely to redeem their vouchers than the participants in the hard-goal prediction condition. The number of vouchers used in each condition can be found in Table 10.

Table 10. Number of participants answering 'yes' on the prediction question, number of vouchers used and group sizes of all conditions.

	Participants predicting 'yes'	Number of vouchers used	Percentage used	N
No-prediction condition	-	17	50.0%	34
Easy-goal prediction	24	20	71.4%	28
Easy-goal prediction plus self-affirmation	33	21	61.8%	34
Hard-goal prediction	11	13	43.3%	30
Hard-goal prediction plus self-affirmation	6	16	51.6%	31

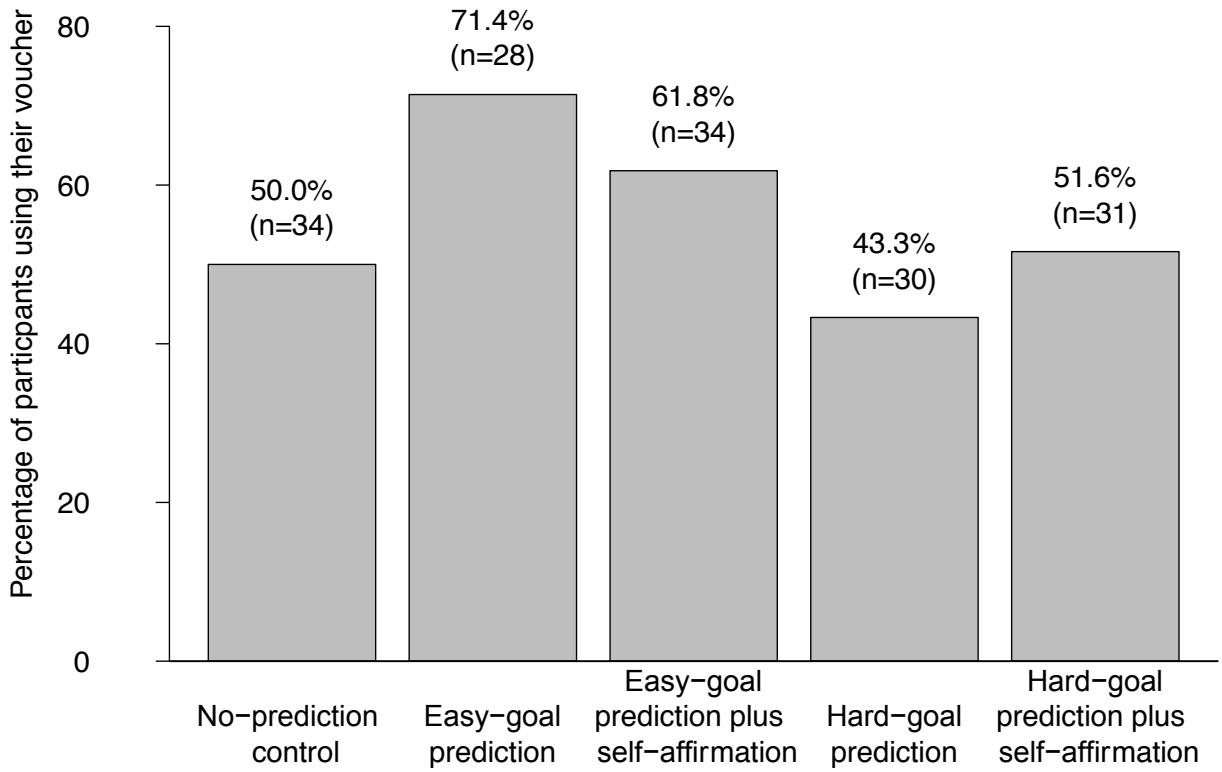

Figure 18. Voucher use per condition in percentages.

12.3.3 Meta-Analytic Findings Studies 5-7

A fixed-effects model was applied on the data of the no-prediction and hard-goal prediction only groups as all three studies used the same independent and

dependent variables. A Q-test supported this decision, since there was no considerable heterogeneity in the true effect sizes, Q (2) = 3.39, p = .18. The meta-analysis showed a significant negative overall effect, RR = -0.38, 95% CI [-0.66, -0.09], p < .01, meaning that asking participants to predict their eating five-a-day behaviour resulted in a 38% decrease in voucher use compared to a no-prediction control condition.

An additional fixed-effects model was applied on the data of the hard-goal prediction and hard-goal prediction plus self-affirmation groups because all three studies used the same independent and dependent variables. A Q-test supported this decision, as there is no considerable heterogeneity in the true effect sizes, Q (2) = 1.98, p = .37. The meta-analysis showed a marginally significant positive overall effect, RR = 0.27, 95%CI [-0.03, 0.57], p = .08, indicating a trend that adding a self-affirmation task to the intervention attenuated the negative effect of the prediction question by increasing the chance of voucher use by 27% compared to the prediction only condition.

12.4 Discussion

The easy-goal question resulted in a significantly higher number of participants answering "yes" to the prediction question compared to the participants in the hard-goal prediction conditions. This difference in answers resulted in a medium sized positive effect between the easy-goal prediction and the no-prediction control group, showing that an easier goal can influence the direction of the effect. In addition, a large effect was found between easy-goal prediction only and hard-goal prediction only on voucher use, showing that asking an easy-goal question increased voucher use compared to a hard-goal question. While the other predicted effect was in the hypothesised direction (the hard-goal condition showing an decrease in voucher

use compared to the control condition), this effect was not meaningful. The same conclusion can be drawn about the self-affirmation conditions, which show attenuated effects compared to their respective prediction only conditions, although no meaningful effects were found.

12.4.1 Easy-Goal vs. Hard-Goal Prediction

The large positive effect of an easy-goal prediction compared to hard-goal prediction indicates that the participants in Study 5 and 6 may have perceived that the goal of eating five-a-day was unrealistic while a trivial prediction such as eating fruit and vegetables during the week was easy to adhere to. This explanation is supported by the significant difference in responses to the prediction question in the easy-goal and hard-goal conditions, with the participants in the easy-goal conditions predicting more often they would reach the set goal. The question remains whether this effect was due to participants' intrinsic feeling that they could not reach the goal of eating five-a-day, or whether they believed none of their peers would eat five-a-day and predicted accordingly in line with the social proof explanation of the question-behaviour effect.

12.4.2 Meta-Analytic Findings

The meta-analytic approach towards studies 5 -7 showed that the negative effect of asking a prediction question regarding eating five-a-day on subsequent voucher use is robust. All three studies showed reduced voucher use after being asked a five-a-day prediction question compared to a control group and the meta-analysis showed a significant negative effect. The meta-analysis comparing the prediction only and prediction plus self-affirmation conditions suggests that adding self-affirmation to

a prediction question attenuates the question-behaviour effect as an increase in voucher use was found. This finding is in line with the study by Spangenberg and colleagues (2003) that showed that an increase in behaviour after a question-behaviour effect intervention can be attenuated when a self-affirmation task is added to the prediction question. Studies 5-7 add to their findings by showing that attenuated effects are not merely found when the initial behaviour is increased after a prediction question, but also when a prediction question leads to a reduction in behaviour as was the case in the five-a-day prediction groups.

12.4.3 Limitations

There are a few limitations of the findings in the present study. The first limitation is that the sample size was quite low, due to low attendance in the classes used in this study. The second limitation is that the time between the prediction question and the first possibility students had to use their voucher differed substantially within the sample. Some students were asked to fill in the questionnaire, and receive their voucher, during a one or two-hour lecture as in Study 5 and 6, while others received the questionnaire at the start of a three-hour lecture. Since students would have to wait to redeem their voucher until their lecture was over, this might have influenced the results.

An indication that the time interval might influence the outcomes comes from the meta-analysis chapter. The meta-analysis showed that time interval between intervention and behavioural measurement moderated the effect size of question-behaviour effect studies. Studies in which participants performed the behaviour within one hour after the intervention showed significantly larger effect sizes compared to longer time intervals. An indication of time effects in the current study is that when

removing the participants who were in a three-hour lecture from the sample, the overall chi-square test was marginally significant. Future research comparing different time intervals experimentally is needed to determine the long-term effects of question-behaviour effect interventions. This time interval could be investigated in relation to when participants are able to collect their free fruit and vegetables (i.e. lecture length) or to when participants are allowed to redeem their voucher (e.g. providing them with a voucher that is only valid on a specific day later in the week instead of on the same day).

There is a slight mismatch between the prediction questions and the actual behaviour. Where the prediction questions relate to fruit and vegetable consumption, the measurement of the focal behaviour is whether or not participants collected a free bowl of fruit or vegetables. While the two behaviours are related, they are not completely similar, as participants prediction they will eat five-a-day or eat fruit and vegetables might have used other means to reach these goals. While participants might have found other means to reach their goals, it seems likely that participants who set their goals would use the opportunity to free fruit or vegetables to make a start towards achieving their goals. Future research could use more explicit measurements, such choice of snack in a taste test as used by Levav and Fitzsimons (2006), to investigate whether the findings of studies 5-7 are valid.

A final limitation is that in studies 5-7, the participants could not set a goal themselves, but instead were asked about specific goals (eating five-a-day or eating fruit and vegetables in the coming week). A study investigating whether asking people to predict how many days in the coming week they would reach the five-a-day goal or asking them how much fruit and vegetables they predict they would eat in the coming week might show different results.

12.5 Conclusion

Studies 5-7 set out to answer the third and final research question of this thesis, which other factors might moderate the question-behaviour effect, by investigating goal difficulty and the role of self-affirmation in relation to the question-behaviour effect. These three studies have shown that asking prediction questions can reduce positive behaviour when the behaviour is deemed too difficult. The meta-analysis across these three studies showed that this finding is robust while the addition of an easy-goal prediction condition in the present study showed that the same behaviour increased when goal was easier to attain. In addition, adding a self-affirmation task to a question-behaviour effect intervention can attenuate the effect both when positive as well as negative effects are obtained. Further research should focus on investigating whether goal-setting or social proof can account for unexpected negative effects of asking prediction questions on positive behaviours.

CHAPTER 13

GENERAL DISCUSSION

In this general discussion, the results of the research described in this thesis will be discussed as well as their implications and ideas for future research. What follows is a discussion about the broader implications of the question-behaviour effect as a social influence technique. Before summarising the results of the studies in this thesis, the contribution of this thesis to the question-behaviour effect literature is discussed.

13.1 Gaps in the Question-Behaviour Effect Literature

There were three gaps in the literature identified at the start of this PhD project. The first gap, as noted by Dholakia (2010), was that there was no meta-analytic evidence for the existence of question-behaviour effects regarding future behaviour predictions, let alone a meta-analysis investigating the overall effect of asking questions about behaviour on subsequent behaviour.

The second gap was that it was still unclear why the effect occurs. The dominant explanations were attitude activation and cognitive dissonance theory, while other suggestions such as process fluency (Janiszewski & Chandon, 2007) have been proposed more recently.

The third gap was a lack of focus on research that investigates possible moderators of the effect in terms of study characteristics and adding other influence elements to a question-behaviour effect intervention. These three gaps resulted in three research questions: “What is the overall effect of question-behaviour effect interventions?”, “What is the underlying mechanism that drives the question-

behaviour effect?", and "What other factors might moderate the question-behaviour effect?"

13.2 What Has This Thesis Added?

This thesis has added to the existing literature by providing answers to these three research questions. First, the conduced meta-analysis updated the overall effect size, providing a better baseline for power calculations for future research and establishing that merely asking questions about behaviour, even after taking into account a possible publication bias, can change subsequent behaviour.

The second way this thesis has added to the existing literature is by suggesting the possibility of social proof as an underlying mechanism of the question-behaviour effect. Studies 1-4 suggest social proof might be related to the phenomenon. The implications of social proof as an underlying mechanism are discussed in this chapter.

A third way this thesis has added to the existing literature is by experimentally investigating the moderating effects of self-affirmation and goal difficulty on the question-behaviour effect. While one other study has investigated self-affirmation in relation to the question-behaviour effect (Spangenberg et al., 2003), the three self-affirmation studies reported in this thesis are the first experimental studies investigating the role of self-affirmation regarding a personal relevant behaviour, eating fruit and vegetables.

13.3 Summary of Findings

13.3.1 Meta-Analysis

In the meta-analysis chapter, several interesting findings emerged. The most basic, yet important, finding is that the effect is robust ($d = 0.26$) and that even though

there seems to be a publication bias, adjusting for this bias still shows a significant effect size (d = 0.11, 95%CI [0.01, 0.21]). This means that although the effect is small, asking people questions about their behaviour does influence subsequent behaviour. Another important finding is that the effect not only occurs in studies that measure the dependent variable by asking participants to self-report their behaviour, but also in studies that measured the behaviour objectively. This rules out the explanation that social desirable responding causes the question-behaviour effect.

Moderator analyses showed that both time interval between the intervention and the behavioural measurement and the type of focal behaviour moderate the effect size of question-behaviour effect interventions. While all time intervals, ranging from one hour up to a year, showed significant effect sizes, the category of studies with a time interval of less than an hour showed significantly larger effect sizes compared to the other time intervals. The moderator analysis for type of focal behaviour showed that both commercial behaviours and pro-self behaviours lead to larger effect sizes in comparison with behaviours classified as pro-others.

13.3.2 Studies 1-4 Understanding the Underlying Mechanisms

The goal of the first four studies was to investigate the underlying mechanism of the question-behaviour effect. These studies were designed to differentiate between attitude activation and cognitive dissonance as underlying mechanisms by adopting a one-session method using recalled past behaviour devised by Spangenberg and colleagues (Spangenberg et al., 2012). Study 1, designed to investigate the effects of predicting future behaviour on positive and negative recalled past behaviour, showed no effect for the positive behaviour (Study 1A, walking for more than 30 minutes) but indicated a negative effect for the negative behaviour (Study 1B, going to bed without

brushing your teeth). This negative effect suggested that cognitive dissonance is the underlying mechanism of the question-behaviour effect, as attitude activation would suggest an increase in recalled behaviour as activated attitudes result in easier recollection of past behaviour. Cognitive dissonance, on the other hand, suggests that people would want to behave in line with their future behaviour prediction and resolve dissonance between their prediction and their actual lack of brushing teeth by underreporting going to bed without brushing their teeth.

Study 2 was designed to investigate whether the scale on which participants recalled their past behaviour could account for the null finding regarding positive behaviours in Study 1. In addition, Study 2 set out to replicate the negative effect found in Study 1B, that asking questions about negative behaviours decreases the recalled past behaviour. The results of Study 2 showed that a time-frequency scale, rather than a likert-type scale, was required to detect any question-behaviour effects related to procrastination behaviour. Asking participants to recall past procrastinating behaviour after asking them to predict future studying behaviour resulted in more recalled past procrastination behaviour in the time-frequency answering conditions, but not in the likert-type answering conditions. This finding seems to support attitude activation as underlying mechanism of the question-behaviour effect since attitude activation would result in easier recollection of past behaviour and therefore a higher level of procrastination reported. A follow-up questionnaire investigating students' perceptions of procrastination showed that they held negative attitudes towards the phenomenon. This finding is interesting as the increased levels of recalled past behaviour seem related to attitude activation as an underlying mechanism of the question-behaviour effect, while these activated attitudes seem to have been negative rather than positive.

Study 3 investigated whether a positive or negative perception of buying bottled water on campus influenced the direction of question-behaviour effect interventions. While providing participants with a positive/negative reason to buy bottled water resulted in higher/lower recalled number of bottles of water bought in the past week, adding a prediction question about buying bottled water on campus attenuated the effect, instead of resulting in a more extreme positive or negative effect. The participants in the negative injunctive norm prime plus prediction condition showed increased levels of recalled past behaviour compared to the participants in the negative injunctive norm prime only condition, and this effect was the opposite for the participants in the positive injunctive norm prime conditions. The participants in the positive injunctive norm prime plus prediction condition showed a decrease in levels of recalled past behaviour compared to the participants in the positive injunctive prime only condition.

Based on new publications on the question-behaviour effect during the course of the PhD and the contradictory findings of studies 1-3, social proof emerged as a possible explanation of the question-behaviour effect. Study 4, a correlational study, investigated the possibility of social proof as an underlying mechanism. Participants were asked to rate how many of their peers engaged in a list of behaviours based on the findings of the meta-analysis, enabling correlations between these ratings and the data in the meta-analysis to be calculated. The results of Study 4 show that participants in the question-behaviour effect groups in the published studies change their behaviour towards social norms compared to the participants in the control groups in these studies. This is a first indication that social proof might be related to the question-behaviour effect, as social proof would suggest that participants behave in line with the perceived behaviour of their peers. This means that while a behaviour

such as procrastination (Study 2) can be considered negative, the behaviour can still be increased as result of a question-behaviour effect intervention when participants hold the perception that their peers engage in procrastination more than they do themselves. However, as Study 4 was correlational rather than experimental, other factors might be at play.

13.3.3 Studies 5-7 the Attenuating Role of Self-Affirmation

The goal of studies 5-7 was to investigate the moderating role of self-affirmation and goal difficulty in a question-behaviour effect intervention. Study 5 showed a decrease in the number of participants using their free fruit or vegetables voucher after answering a prediction question. Adding a self-affirmation task to the prediction question attenuated the effect of asking prediction questions on behaviour. Interestingly, this attenuation of the question-behaviour effect was in the opposite direction compared to the earlier study by Spangenberg et al. (2003), who found attenuating effects of self-affirmation after a prediction question initially increased the occurrence of the focal behaviour. The finding that self-affirmation can moderate question-behaviour effects suggests that some form of dissonance processes might be involved in the question-behaviour effect. This study resulted in two more studies investigating how self-affirmation affects the behavioural outcomes of question-behaviour effect research, one investigating the role of adding self-affirmation before asking participants to predict their future behaviour regarding eating five-a-day (Study 6) while the other investigated a broader prediction question, eating fruit and vegetables (Study 7).

Study 6 showed that while the effect was smaller compared to the effect in Study 5, participants who answered a prediction question about eating five-a-day still

showed lower levels of voucher use compared to the control group. Again, adding a self-affirmation after the prediction question attenuated this effect. However, placing the self-affirmation task before the prediction question did not result in a higher number of participants predicting they would eat five-a-day, showing that letting participants self-affirm before asking a prediction question does not influence the answers on this question or subsequent behaviour.

As the finding that asking a prediction question reduced voucher use was unexpected, Study 7 set out to test whether an easier goal (eating fruit and vegetables) compared to a difficult goal (eating five-a-day) could increase voucher use. While the overall effect was non-significant, there was a trend showing that asking an easy goal question resulted in a higher number of participants redeeming their voucher compared to the control condition that did not answer a prediction question. In addition, there was an effect of goal difficulty on voucher use as the participants who were asked an easy-goal prediction question redeemed significantly more vouchers than the participants who were asked the hard-goal prediction question.

A meta-analysis on studies 5-7 showed that asking a prediction question about eating five-a-day significantly reduced voucher use and that adding a self-affirmation task showed a trend of attenuating the effect of the prediction question on voucher use.

13.4 Underlying Mechanisms of the Question-Behaviour Effect

13.4.1 Attitude Activation

One of the goals of this thesis was to investigate whether attitude activation or cognitive dissonance causes the question-behaviour effect to occur. Based on the findings, it seems attitude activation can be ruled out as cause of the question-

behaviour effect. Only Study 2 and Study 3 showed any results that are consistent with attitude activation as underlying mechanism. In Study 2, the increase in reported procrastination in the time-frequency prediction condition compared to the control condition suggested attitude activation as underlying mechanism, as cognitive dissonance would suggest a decrease instead of the found increase in procrastination levels. Study 3 showed a non-significant increase in the reported number of bottles of water bought in the last week for the negative norm plus prediction condition compared to the negative norm condition. While cognitive dissonance would have predicted the effect to be in the opposite direction, the finding that in the positive norm conditions the prediction resulted in a *decreased* rather than an increased number of bottles of water bought contradicts both attitude activation and cognitive dissonance explanations.

13.4.2 Cognitive Dissonance

Compared to attitude activation, there seems to be more evidence for some sort of dissonance processes to underlie the question-behaviour effect. Study 1 showed that participants were likely to underreport going to bed without brushing their teeth after a prediction question, and studies 5-7 showed that adding a self-affirmation task attenuated question-behaviour effects. The finding that self-affirmation attenuates the question-behaviour effect implies that the underlying mechanism is related to some form of self-related dissonance process. Self-affirmation is a technique to reduce dissonance by affirming a positive self-image (Steele & Liu, 1983). If attitude activation was the driving factor in the question-behaviour effect, adding self-affirmation should not influence the behavioural outcome as it did in studies 5-7.

However, not all studies in this thesis are in line with cognitive dissonance as underlying factor of the question-behaviour effect. As mentioned in the attitude activation section, the findings of Study 3 cannot be explained by either attitude activation or cognitive dissonance. Furthermore, the findings in studies 5-7 that asking a prediction question resulted in *lower* voucher use can also not be explained by cognitive dissonance. These findings can also not be explained by attitude activation as Study 5 showed that students hold positive attitudes towards eating fruit and vegetables and therefore an increase in voucher use was expected in the prediction condition compared to the control condition.

13.5 Alternative Explanations

13.5.1 Self-Regulation and the Question-Behaviour Effect

The empirical studies in this thesis suggest some form of self-related regulation process might also be related to the question-behaviour effect. While Study 4 focused on the possibility of social proof as an underlying mechanism of the question-behaviour effect, there are several other theories that might explain the findings as well. One framework that can be used to discuss these different explanations is self-regulation (Bandura, 1991).

The process of self-regulation is described as follows by Carver and Scheier (2000). First, a goal is identified, which is then pursued. If no problems arise, the goal is attained. However, if any obstacles come up, people evaluate their expectancy of success. This evaluation leads to a level of confidence. High levels of confidence indicate that people are confident they can succeed, while low levels of confidence result in the conclusion that the goal is unattainable. If they deem the goal

unattainable, they might focus on an alternative goal that is easier to attain. However, if no such goal exists, they disengage with the initial goal and give up.

Goal-Setting.

Goal-setting and goal framing seem related to the question-behaviour effect when looking at the results of studies 5-7. As Study 7 showed, participants who were asked to predict eating fruit and vegetables were more likely to redeem their free fruit and vegetables voucher than participants who were asked to predict eating five-a-day. This finding is interesting as the dependent measurement, whether or not participants redeemed their voucher, did not change between these two different goal conditions. This suggests that there might be an influence of goal-setting or perception of goal difficulty on the effectiveness and underlying mechanisms of the question-behaviour effect.

13.5.2 Social proof.

The findings of Study 4 – a significant correlation between social proof scores and behaviour of people in experimental conditions in the meta-analysis – suggest that social proof might be related to the question-behaviour effect and influence how people set their goals by looking at the behaviour of peers.

If social proof were an underlying mechanism of the question-behaviour effect, this would influence people as follows. People are asked a question about their behaviour (e.g. a future behaviour prediction) and related concepts are activated. As people are not often asked to predict their future behaviour, contemplating the question whether or not they predict to do 'X' might cause them to think not only of their own past experience with the behaviour or their attitudes towards the behaviour, but also to ask themselves what their peers would do in their situation. If the

behaviour is new, for example posting envelopes as requested by the researcher (Chapman, 2001), people do not have prior experience with the behaviour and so the perceived behaviour of peers might become more important. As research on social proof shows that people prefer to behave in line with the perceived behaviour of others (e.g. Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007), the perceived behaviour of peers could be used to answer the prediction question and set the goal. As this answer, and the related goal, is not necessarily in line with the personal past behaviour of the participant, this evokes feelings of dissonance. Like the cognitive dissonance explanation of the question-behaviour effect, this dissonance in turn is resolved by behaving in the predicted manner.

If social proof were an underlying mechanism of the question-behaviour effect, this might not only explain the findings of Study 1B, that originally seemed to support cognitive dissonance as participants who made a prediction about future teeth cleaning behaviour reported less going to bed without brushing their teeth in the past, but it might also explain the increase in reported procrastination after making a prediction in Study 2. Participants might have set their goal based on the perceived behaviour of others, resulting in the found increase in procrastination rather than a decrease.

Furthermore, the attenuated effects of Study 3 indicate that answering a prediction question overpowers norm effects. Social proof can explain these findings as participants' perception of what their peers do is unrelated to the norm primes they encountered earlier.

Downward comparison.

If social proof is related to the question-behaviour effect, this implies that other concepts related to the self might play a role in goal-setting as well. Since social

proof focuses on the perceived behaviour of others, this suggests social comparison processes such as downward comparisons (Wills, 1981) might also be at play. People who are asked prediction questions about their behaviour might not only focus on what they believe their peers do, but also judge this behaviour and adjust their predictions and future behaviour accordingly. For example, they might view that their peers are less likely to engage in the behaviour compared to themselves, and use this downward comparison to feel better about themselves, possibly resulting in larger effects compared to behaviours where social proof is not as strongly present. Downward comparisons could not only increase occurrence of behaviour, but also decrease the occurrence, as participants might perform vice behaviours less often based on perceiving themselves as 'better' in comparison with their peers.

Peers as reference point for goal-setting.

In terms of goal-setting, social proof would suggest that goals are set in line with the behaviour of peers. Using peers as a reference point can explain the unexpected finding in Study 5 that asking a prediction question resulted in a reduced voucher uptake. Participants might have held the perception that their peers would not eat five-a-day and adjusted their goals accordingly, thereby reducing their chances of eating five-a-day in line with their perception of social proof. The addition of an easier goal in Study 7, eating fruit and vegetables rather than eating five-a-day, showed that using an easier goal that more peers will engage in, changed the direction of the effect instantly.

The suggestion of social proof as a factor relating to the question-behaviour effect is not only supported by the data, but is also a reasonable explanation based on the methods of a typical question-behaviour effect intervention. People are not often asked by their peers to predict their future behaviour without context. Friends might

ask each other whether they plan to go to a social event organised by a mutual friend, or whether or not they will go to a music festival, but all these questions are asked in social settings where other factors such as who else is going and what they might get out of it are considered on a case-by-case basis.

The type of questions participants have to answer in question-behaviour effect research often focus on future behaviour predictions or intentions, sometimes regarding new behaviours such as mailing envelopes (Chapman, 2001) or taking part in scientific experiments in return for movie tickets (Van Kerckhove et al., 2009). With nothing else to go on, participants might turn to their social environment. Their perception of the behaviour of peers could become a base line they can focus on. They then predict their future behaviour, and set their goal, in line with this perceived behaviour of others and act accordingly. Since the data on the relation between social proof and the question-behaviour effect was correlational rather than experimental, further research is needed to investigate whether a causal link between these two concepts exists.

False consensus effect.

While peers might be used as a reference point, the perceptions about the behaviour of peers are not necessarily valid. One theory explaining discrepancies between perceptions and actual behaviour is the false consensus effect (Ross, Greene, & House, 1977), the suggestion that people feel their opinions and attitudes are common to a greater extent than they factually are, and that other views are uncommon. For example, people who showered during a shower ban overestimated the showering behaviour of others compared to people who did not shower (Monin & Norton, 2003), and people who smoked had higher estimations of the number of adolescents that smoke compared to non-smokers (S. J. Sherman, Presson, Chassin,

Corty, & Olshavsky, 1983). Mullen and Goethals (1990) stated that people do not question what other peoples' opinions are, as they are confident that they know these opinions without asking. So while asking people questions about their behaviour might activate social norms, which are used in the goal-setting process, these norms could be biased based on whether people hold a strong belief regarding how common their own beliefs are.

13.5.3 Arising Obstacles

Goal Difficulty.

Since self-affirmation attenuated negative question-behaviour effects in studies 5-7 as shown by the meta-analysis across these three studies, the processes of the question-behaviour effect might be more complex than merely goal-setting through self-discrepancy or activation of social proof concepts. A possible moderator is difficulty of the set goal. The effect of goal difficulty is interesting as the behavioural measurement in studies 5-7 was similar across all conditions: redeeming a voucher. Asking an easy-goal prediction question resulted in a significant increase in voucher use compared to asking a difficult-goal prediction question. This indicates that perception of the difficulty of the goal can moderate the outcome of a question-behaviour effect intervention.

13.5.4 Confidence

Promotion or prevention focus.

Two important goal-setting related concepts are promotion focus and prevention focus (e.g. Higgins, Shah, & Friedman, 1997; Higgins, 1998). These different types of focus influence whether or not people will reach their set goal.

People with a promotion focus work towards accomplishments while people with a prevention focus try to avoid failure. These two types of focus could influence how confident people are that they will attain their goal. People with a promotion focus might be (unrealistically) confident, while people with a prevention focus might choose to abandon a goal and start looking for alternative goals or give up as described in the self-regulation framework.

Therefore, promotion and prevention focus might explain the findings of studies 5-7 that an easier goal resulted in more vouchers redeemed compared to a difficult goal. In the hard-goal conditions, participants with a prevention focus might have had a lower level of confidence in attaining the goal and therefore have decided to predict they would not eat five-a-day, reducing the chance of failing their goal. In turn, the easier goal of eating fruit and vegetables might have been perceived as low risk and achievable, thereby increasing confidence and resulting in a larger number of participants redeeming their voucher.

Self-efficacy.

Self-efficacy (Bandura, 1977), the belief someone has that they are capable to reach a goal, might be another factor explaining some of the findings in studies 5-7. For example, participants who were asked whether or not they would eat five-a-day might have felt that they would not have the self-control to eat five-a-day for a full week, or that they would not have the cooking skills to add enough portions of vegetables to their meals to reach their five-a-day goal. As the goal in the easy-goal conditions in Study 7 was set within reach – eating fruit and vegetables in general, instead of a specific amount – their self-efficacy might have been high, as there was a voucher they could use to fulfil the goal within a short time frame after completing the question-behaviour effect questionnaire. Like perceived behavioural control, self-

efficacy could influence the confidence people have in their abilities to attain the goal they are setting, with high levels of self-efficacy leading to higher levels of confidence.

Self-handicapping.

While the different directions of the found effects in studies 5-7- are explained by the goals that were set for the participants in the prediction questions (eating five-a-day or eating fruit and vegetables), another possible explanation is that participants with low confidence gave up on attaining the goal through self-handicapping (Berglas & Jones, 1978; Jones & Berglas, 1978). Theory on self-handicapping suggest that people would rather fail a task while having a good reason for doing so, than to have a chance to succeed but not have an excuse if they fail. Participants in the fruit and vegetable studies might have used the same reasoning regarding the eating five-a-day goal and chose not to use their free fruit and vegetables voucher so they could explain not eating five-a-day by stating they did not collect the free fruit and vegetables.

Peers as reference point for perceived behavioural control and self-efficacy.

Peers might not only be used to set the goal, as described in the social proof section, they might also be used to estimate confidence through perceived behavioural control and self-efficacy. People might use their perception of the behaviour of peers to decide what others do (goal-setting) and whether or not they succeed or have the abilities to attain their goals (perceived behavioural control and self-efficacy).

Implications of social proof as underlying mechanism of the question-behaviour effect.

The suggestion that social proof might be an underlying mechanism of the question-behaviour effect has several implications related to the understanding and

applicability of the question-behaviour effect as social influence technique outside the self-regulation framework.

Strength of social proof perception.

The direction and size of the effect would not only relate to a perception and judgment of the behaviour of their peers, but also on the strength of this perception. Seeing peers performing a behaviour to extreme extents (i.e. either 'all the time' or 'never') can make people more certain about their social proof perception and influence them to act accordingly. In this case, a distribution of certainty in relation to social proof scores would show a U-shape as participants might feel more certain about their social proof perceptions when they are confronted with the behaviour of others all the time or when they are never confronted with this behaviour compared to behaviours that are occurring occasionally.

This factor can influence participants in different ways, based on the experiences of the participants. As a study by Schultz and colleagues showed, social proof interventions can backfire when participants are already behaving in the desired way to a more extreme extent than social proof would suggest (Schultz et al., 2007). They found that informing households of their energy use compared to other households, resulted in a decrease in energy use in households using more energy than their neighbours, but achieved the opposite effect, an increase in energy use, for the households that initially used less energy compared to their neighbours. The question is whether such an effect would be due to different goals set by the households, or whether the perception of successfully attaining the goal is different. For example, energy efficient households might still set the goal to not waste energy, but perceive having a 'buffer' as other households are doing worse.

Collectivistic and individualistic orientations.

In addition, research on social proof suggests that people with collectivistic rather than individualistic orientations are influenced to a greater extent by social proof information (Cialdini, Wosinska, Barrett, Butner, & Gornik-Durose, 1999). So even if social proof is an underlying mechanism of the question-behaviour effect, this does not mean that it affects all members of an intervention group in the same manner or to the same extent.

The small effects found in the question-behaviour effect literature might be due to social proof concepts being activated in a weak manner, because participants vary in terms of prior experience with the behaviour or differences in collectivistic and individualistic orientations. Future research using subgroup analysis and different levels of social proof priming tasks could investigate whether the found correlation between social proof scores and the percentages of people performing a behaviour after being asked questions about their behaviour was an indication of a causal link.

Implications for the applicability of the Question-Behaviour Effect.

In terms of applicability, the implication of social proof as an underlying mechanism means that the question-behaviour effect should be compared with other social proof interventions experimentally to identify its value. So far, the consensus is that while the question-behaviour effect has a small impact on behaviour, it is a meaningful impact as the intervention itself is cost efficient (e.g. Allen et al., 2013). However, if social proof drives the question-behaviour effect and other social proof interventions (such as informing participants of the actual behaviour of others) are consistently outperforming the question-behaviour effect as an influence technique, the question-behaviour effect might lose its added value.

Another implication of social proof as an underlying mechanism of the question-behaviour effect is that question-behaviour effects do not merely increase occurrence of behaviour, but change behaviour in a particular direction based on the perceptions related to the behaviour. Therefore, large effects are to be found not when the behaviour is considered desirable, but when the discrepancy between the actual behaviour of peers and the perceived behaviour of peers is large. Moderating factors would be self-efficacy and perceived behavioural control, as even when people believe they should change their behaviour, they require the skills to do so (self-efficacy) and the belief that the can achieve the change in behaviour (perceived behavioural control).

13.6 Self-Affirmation as Attenuating Factor of the Question-Behaviour Effect

While earlier research showed that adding self-affirmation to a question-behaviour effect task could attenuate a positive question-behaviour effect (Spangenberg et al., 2003), studies 5-7 showed that negative effects can also be attenuated. The question remains as to which process causes this attenuation of negative question-behaviour effects. While attenuating a positive effect indicates resolved dissonance, it seems unlikely that resolving dissonance would motivate people to put *more* effort into a task, using their voucher to collect free fruit and vegetables, thereby attenuating the negative effect of the prediction question.

Possible processes causing the attenuation of negative effects could relate to a form of learned-helplessness (Seligman, 1972) that people might feel after being presented with an unobtainable goal such as eating five-a-day. This perception of eating five-a-day being too difficult, and therefore influence people in giving up to reach the goal, might change after people self-affirm. Self-affirmation could change

their perception of eating five-a-day from “too difficult” to “just manageable”, or they might feel more motivated to do something good, and are therefore more likely to collect the free fruit and vegetables.

Another possibility is that the aforementioned downward comparisons are activated as part of the self-affirmation task, since people are affirming their self-image and might compare this image to their perception of their peers. This downward comparison could lead to a motivation to show that they are better than their peers by behaving in a more responsible manner.

13.7 Universality and Applicability of the Question-Behaviour Effect

The meta-analysis showed that, as expected, studies where the focal behaviour is measured shortly after the intervention has been presented resulted in increased effect sizes. However, even studies using long time intervals (i.e. measuring behaviour a year after the intervention) show effects of asking questions on subsequent behaviour. This provides researchers and policymakers with an influence technique that could induce a lasting change in behaviour, albeit a relatively small effect. The findings of the meta-analysis that the question-behaviour effect can be applied to a wide range of behaviours, settings and time intervals, as well as being effective using different types of questions validates the question-behaviour effect’s practical value. The phenomenon is not merely found in lab-settings (e.g. taste tests, Levav & Fitzsimons, 2006), but in real-world applications as well (e.g. blood donation on campus, Cioffi & Garner, 1998).

So where does the question-behaviour effect stand in terms of applicability? As shown in the meta-analysis, question-behaviour effect interventions tend to only cause small changes in behaviour. However, while the effects might be small, the

intervention itself is small as well. As shown in the empirical part of this thesis, asking a single yes/no question was sufficient to change real behaviour such as eating fruit and vegetables (Study 5). This means that the costs of creating an intervention using the question-behaviour effect as influence technique are low and the designing stage can be relatively short.

13.7.1 When (Not) to Use the Question-Behaviour Effect as an Influence Technique

As discussed in the literature review, there has been some controversy regarding whether the occurrence of negative behaviours can increase as a result of asking people questions about their behaviour. While the evidence seems inconsistent at best, there are situations where asking questions about behaviour could result in a negative effect on future behaviour. As Study 1B showed, asking participants to predict a negative behaviour (going to bed without brushing your teeth) leads to a reduction in recalled past behaviour. However, Study 2 showed that asking questions about studying behaviour resulted in increased levels of recalled past procrastination behaviour. This implies that question-behaviour effect interventions related to negative behaviours could potentially result in increases in these negative behaviours.

The negative effect of asking questions on future behaviour was especially visible in studies 5-7 where asking questions about eating five-a-day resulted in reduced numbers of participants using a voucher to collect free fruit and vegetables. Suggesting social proof as a possible underlying mechanism rather than attitude activation or cognitive dissonance puts these findings in perspective. Social proof suggests that prediction questions prime participants with the perceived behaviour of others. This perception is then used to predict future behaviour, as people have a need

for consistency (Cialdini et al., 1995). A negative outcome of a question-behaviour effect intervention could be avoided by measuring the perceptions of the behaviour of peers in the target group, and alter these perceptions if necessary, before designing a question-behaviour effect intervention. The results of studies 5-7 suggest that in addition to perceptions about the behaviour in general, perceptions of the goal set by the prediction question are also important. If participants feel that they can achieve the set goal, they are more likely to act accordingly, while a seemingly unachievable goal resulted in reduced effort made to reach the goal.

13.8 Future Research

The meta-analysis in this thesis, as well as the recently published meta-analysis by Wood et al. (2015) established that the question-behaviour effect is robust and can influence behaviour in terms of both short as long time intervals, regarding different behaviours and in different settings. Therefore, future research should focus more on understanding the effect and identifying its place in the social influence literature. A focus on comparing different methods of designing question-behaviour effect studies, and studies focusing on dissecting the underlying mechanisms, is more important than demonstrating that the technique can change a behaviour that has not been tested before. While some researchers have started this by comparing the question-behaviour effect to other types of interventions (e.g. implementation intentions, Godin et al., 2014) or by comparing different types of questions such as attitude and intention questions (e.g. Chapman, 2001), more of these direct comparisons of different question-behaviour effect aspects are needed. Testing the moderator findings of the meta-analysis experimentally can help determine the boundaries of the question-behaviour effect in terms of intervention setting, type of

behaviour or time interval between the intervention and the change in behaviour. In addition, it would be interesting to test the effects of different control conditions. In studies 1-7, the control conditions were not asked any prediction questions. While this method is common in question-behaviour effect research (e.g. S. J. Sherman, 1980; van Dongen et al., 2013), other researchers have used unrelated prediction questions for the control conditions (e.g. Spangenberg et al., 2012). Comparing control groups could help determine whether there are differences in control groups used.

The suggestion of social proof as an underlying mechanism raises new, interesting research questions related to moderators and requirements of question-behaviour effect interventions. Not only the afore mentioned focus on measuring social proof before designing question-behaviour effect interventions is important, but also the addition of other concepts such as certainty of social proof perceptions and influence of downward comparison is key, the latter having received some attention in the question-behaviour effect literature (Spangenberg et al., 2003). Comparing question-behaviour effects and the influence of social norm primes with other types of norms, or no norms could help evaluating the possibility of social proof as an underlying mechanism of the question-behaviour effect.

Testing different aspects of the question-behaviour effect provides the opportunity to draw conclusions about its applicability as a social influence technique and its effectiveness compared to other techniques. In addition, combining a question-behaviour effect intervention with other social influence tasks can help identify possible underlying mechanisms. Study 3 and studies 5-7 demonstrate that this type of research might show surprising results. Study 3 showed that adding a prediction question to a negative or positive norm prime attenuated the effect of the prime and studies 5-7 showed that adding a self-affirmation task attenuated negative

consequences of a prediction question. Knowing which tasks can inflate or attenuate the question-behaviour effect adds to the body of knowledge about the understanding and applicability of the question-behaviour effect as social influence technique.

Not only comparisons of settings, types of questions or the influence of adding other tasks are needed, but also more comparisons of where the question-behaviour effect stands compared to other interventions. Many papers suggest that the question-behaviour effect is an easy, cheap way of influencing behaviour on a large scale (e.g. Allen et al., 2013). And while this seems to be true, it is unclear what the actual benefits of this type of intervention are compared to other social influence techniques.

Research on the strengths and limitations of the question-behaviour effect will help establishing its worth as an influence technique. The aforementioned focus on understanding why the effect occurs, comparing this technique to other techniques in an experimental way and adding factors that might affect influence attempts such as self-affirmation to the intervention are key in order to gain a better understanding of the effect and its applicability.

13.8.1 Future Research on the Question-Behaviour Effect and Social Proof

The results of Study 4 suggest that the question-behaviour effect might be linked to social proof. Since this was a correlational study using UWE students to estimate social proof scores for behaviours investigated in student populations around the world for the last 35 years, this first study is interesting, but only a small first step in this direction. It would be useful to investigate the role of social proof in question-behaviour effect research experimentally.

As mentioned in the social proof section, not only studies investigating social proof as underlying mechanism are interesting, but also a study addressing the

question of whether asking prediction questions adds anything to the effects of social proof interventions. If question-behaviour effects are consequently outperformed by social proof interventions, using prediction questions instead of priming people with social norms might not be the preferred option. The question then becomes whether there is a place for the question-behaviour effect alongside social proof in terms of applicability or research setting.

One situation in which social proof and the question-behaviour effect could coexist is when participants' perceptions of peer behaviour are more optimistic than the actual behaviour of their peers. As providing misleading information could be seen as unethical, it would be difficult to design a social proof intervention when the perceptions of peers' behaviour are more positive compared to the actual behaviour of peers. A social proof intervention ("XX per cent of the people in your peer group are doing this.") could backfire and result in a reduction instead of an increase in the behaviour. However, since the question-behaviour effect would trigger people to think about the perceived norm, which might be inflated compared to the descriptive norm, such intervention could have a positive effect.

Future research into different types of norms and the question-behaviour effect is interesting as the different types of norms might influence the question-behaviour effect in different ways. Cialdini, Kallgren and Reno (1991) discussed the difference between descriptive and injunctive norms. Descriptive norms focus on what people do, while injunctive norms focus on what people ought to do, or the perception of what people consider behaviour they would approve of. In addition, they suggested that people hold personal norms, a set of rules people use as standards for their own actions and behaviour (Kallgren, Reno, & Cialdini, 2000).

It is possible that asking questions about behaviour automatically activates a specific type of norm (e.g. descriptive), which is then used to make the future behaviour prediction. By systematically comparing question-behaviour effects with conditions in which different types of norms are primed, as well as testing different levels of the norm (e.g. weak/strong norms), the understanding of why the question-behaviour effect occurs could be expanded.

In addition, adding an intervention focused on changing peoples' perception before administering a question-behaviour effect intervention could help change behaviour for the better. Related to Study 2, if students' perception of the procrastination behaviour of their fellow students could be altered and students believe that their peers do not procrastinate very often, but focus on studying instead, then a question-behaviour effect intervention is more likely to reduce procrastination in those participants. This would mean that the effect of asking prediction questions could be reversed and the students could be influenced to focus more on studying and spend less time procrastinating.

The negative behavioural findings in studies 5-7 show the importance of pre-testing a question-behaviour effect intervention before administering it to a large sample or the whole target population. Conducting either a small pilot study, or a pre-test of attitudes and norms regarding the focal behaviour could prevent a question-behaviour effect intervention to achieve a change in the opposite direction and could help in estimating the effect size and viability of a large scale intervention programme. As discussed in the meta-analysis chapter, while the expected effect sizes of question-behaviour effect interventions are small, they can produce meaningful outcomes when applied on a large scale.

13.8.2 Future Research Based on the Meta-Analysis

Future research should not just focus on why the effect occurs or on comparing its effectiveness relative to other social influence techniques, but also on testing experimentally whether the conclusions in the meta-analysis hold up. For example, the finding that studies in which the focal behaviour was measured within one hour after answering the prediction question resulted in a significantly larger effect size compared to longer time intervals. Is this merely due to time as a variable, or might the setting of the study also play a role? It is expected that lab studies would measure the outcome shortly after the intervention has been administered.

In Study 7, the found effects were larger when a group of students who had a three-hour time interval between intervention and opportunity to redeem their voucher were removed from the sample, and only one and two-hour time intervals remained. Since these groups were too small to run separate analyses for, this is merely an indication that there might be time effects, but other variables might also have played a role. The effect of time could be tested by field studies that vary the time interval between intervention and behaviour measurement, or by lab studies in which the focal behaviour is measured in the same session, or, for example, in a second session a week later. Studies like these would help the field of question-behaviour effect research, as it would provide a systematic structure of testing different aspects of the phenomenon.

Another factor worth investigating experimentally is the type of intervention question. In the experimental studies in this thesis, the intervention has always consisted of a prediction question. While some research has experimentally compared different types of questions (Chapman, 2001), a series of studies investigating these different questions would be helpful. The advantage of knowing more about which

questions have an effect on subsequent behaviour is that the intervention can be designed more efficient, as questions that do not influence behaviour could be removed from an intervention questionnaire.

For example, while the meta-analysis did not show significant differences between different types of questions, the meta-analysis by Wood and colleagues (Wood et al., 2015) showed that questionnaires based on the theory of planned behaviour (Ajzen, 1991) did not influence behaviour. However, since this conclusion is based on a meta-analysis, it is difficult to say whether that was due to the type of questions asked, or caused by some other characteristic such as time or type of behaviour. An experimental approach could be used to test these ideas and improve understanding of the question-behaviour effect and its universality and applicability.

In terms of behaviour, the meta-analysis showed that both self-reported behaviour and objective behaviour measurements differed significantly from a control group when people were asked questions about their behaviour. However, it is not clear whether an increase in self-reported behaviour reflects an actual change in behaviour or that asking questions results in social desirable responding in these participants. Studies comparing the two measurements of behaviour could be used to investigate to what extend letting participants self-report their behaviour reflects their actual behaviour. This would help in designing other studies, as more knowledge on how alike the two measurements are, can inform the validity and reliability of studies using self-reported behaviour in the future. It can be advantageous to measure self-reported behaviour instead of using an objective measure in cases where the behaviour might be very personal, such as personal hygiene, or when objective measurements are more expensive to obtain (e.g. a study that offers participants

pedometers to measure their physical activity as used by Spence, Burgess, Rodgers and Murray (2009).

13.8.3 Need for Improvement of Methods in Question-Behaviour Effect Research

The use of a meta-analysis to investigate the question-behaviour effect did not only result in an overall effect size and possible moderators, it also showed that the methods used in question-behaviour effect research can be improved. One of the criteria used to include or exclude studies from the meta-analysis was the design of the study. Only experimental studies where the participants were randomly assigned to conditions were included in the meta-analysis. In addition, the study had to report a control group that did not receive any intervention and the statistical information should be obtainable. Of the total 147 studies identified as question-behaviour effect studies, 33 of the 100 excluded studies were excluded based on these criteria related to study design.

This suggests a need for higher standards in question-behaviour effect research. Given that the overall effect size is small, it is important to rule out methodological weaknesses to increase the robustness of findings of individual question-behaviour effect studies. Apart from studies not using true randomisation when assigning participants to different conditions, another key issue that resulted in exclusion from the study sample for the meta-analysis was that some studies did not use a control group that did not receive any intervention. Because of this, it is difficult to draw any conclusions as to whether asking questions has an effect on subsequent behaviour compared to doing nothing at all. If there is a difference between two intervention groups, where one receives a prediction question and the other receives a different intervention, it is impossible to tell whether asking the prediction question

had a positive, negative or no effect compared to not presenting participants with an intervention.

This issue is also encountered in Study 3, where the control groups received norm primes related to buying bottled water on campus. Adding a control group to the study would have illustrated whether adding the prediction question had an effect compared to no intervention and whether it was the positive norm that increased recalled past behaviour, the negative norm that decreased it or that both influenced recalled behaviour in opposite directions. Similarly, without adding the control condition to studies 5-7, it would have appeared that self-affirmation increased rather than attenuated question-behaviour effects.

Future research could also investigate the design of the control group questionnaire. Studies 1-7 used control groups in which participants were not asked any prediction question. The reason for this was to compare how not intervening and asking a prediction question would lead to differences in recalled or actual behaviour. However, it would be interesting to investigate whether there are effects of asking prediction questions in general, even if the question is unrelated to the focal behaviour. It is possible that asking general questions activates processes that in turn influence performance of the focal behaviour. A comparison of a no contact control condition with a control condition that is asked a question about an unrelated behaviour and a question-behaviour effect condition could advance the knowledge of what kind of control group should be used in question-behaviour effect research.

A related issue is that several studies do not include a condition that only consists of the question-behaviour effect intervention. This way, it is difficult to investigate the added effects of other intervention elements, as there is no way to tell whether it is the question-behaviour effect adding to the existing intervention or

whether the question-behaviour effect would have had the same effect without the other elements that are added to it.

One of the methods used in the question-behaviour effect literature is that instead of not having a control group, some studies used control groups that were actually question-behaviour effect interventions. For example, a study focussing on flossing behaviour used a prediction question related to reading in the control condition and a prediction question about flossing in the experimental conditions (Levav & Fitzsimons, 2006, Study 1). During the analysis, each group was used as control group for the other behaviour that they were not questioned about. While this reduces the number of participants needed in a study by 50%, assuming that the prediction question in each condition is in no way related to the other without evidence supporting such claim might skew results.

13.8.4 Need for Focus on Embedding New Theories in Existing Frameworks

In the literature review, a large number of theoretical explanations of the question-behaviour effect have been discussed. Among those are widely researched explanations (i.e. cognitive dissonance, attitude activation) and more novel theories (e.g. ideomotor theory). While most explanations are accompanied by data to support the suggestions of the researchers, the evidence is fragmented. Ideomotor theory for example is only discussed in a single publication and no further research into that explanation has been conducted (Spangenberg et al., 2008).

The lack of consistency in theoretical frameworks in question-behaviour effect papers raises the question of whether different explanations can account for all question-behaviour effect findings, or only for specific findings discussed in the theoretical papers. It is difficult to value the findings of these studies, as it is unclear

whether or not more research into these explanations has been conducted. The ideomotor theory as proposed by Spangenberg and colleagues (Spangenberg et al., 2008) illustrates this issue. In this theoretical paper, the authors discuss the possibility of ideomotor theory as underlying mechanism of the question behaviour effect.

While the authors do not provide empirical evidence for ideomotor theory as underlying mechanism of the question-behaviour effect, they describe studies that could be conducted to investigate the validity of their proposed theory. So far, no studies investigating ideomotor theory as underlying mechanism have been published. It is unclear whether this is due to a form of publication bias in which studies that find null-effects are often not published or that the studies have not been conducted. To advance the field of question-behaviour effect research, more empirical work on comparing different explanations and finding more evidence for specific underlying mechanisms is key. Some researchers have adopted this approach (e.g. Perkins et al., 2008) and the focus on designing studies that could differentiate between different explanations (i.e. attitude activation and cognitive dissonance) was the focus of studies 1-3 in this thesis. The use of self-regulation as a framework to discuss the findings in this thesis might be a first step in that direction.

13.8.5 Need for Openness about Null-Results in the Question-Behaviour Effect Literature

Since the effects found in question-behaviour effect literature and the various meta-analyses are small, there is a need for openness about null findings in question-behaviour effect research. As the meta-analysis showed, it is likely that there is a publication bias present, which, if the missing studies would have the effects

estimated by the trim and fill analysis, would reduce the overall effect from $d = 0.26$ to $d = 0.11$.

While the number of published question-behaviour effect studies that report null findings is small, the majority of these studies have been large-scale field studies. These large-scale studies, (e.g. blood donation, Godin et al., 2014; or voting behaviour, Greenwald et al., 1987) are interesting since the power of these studies is likely to be high, thereby reducing the chance of type II errors. Research on publication bias in clinical research has found that sample size affects the likelihood of a study being published, meaning that large-scale studies with null results are more likely to get published than small-scale studies (Easterbrook, Berlin, Gopalan, & Matthews, 1991). This indicates there is a clear need for more openness regarding small scale null-findings as not all behaviours are relevant to investigate on a larger scale and the positive findings from small-scale studies need to be corrected for non-significant findings in others.

In summary, future research should focus on understanding the question-behaviour effect and its applicability in relation to other influence techniques. This research should use high quality methods and where possible, embed suggested underlying mechanisms in existing frameworks. Lastly, since the effect of asking questions about behaviour on subsequent behaviour is small, openness about null findings is required for a balanced view about the effectiveness of the question-behaviour effect as social influence technique.

13.9 Conclusion

The goal of this thesis was to answer three research questions: “What is the overall effect of question-behaviour effect interventions?”, “What is the underlying mechanism that drives the question-behaviour effect?”, and “What other factors might moderate the question-behaviour effect?”

In terms of the overall effect, this thesis has found that, although the effect is small, the question-behaviour effect is a robust social influence technique that can influence behaviours across settings, focal behaviours and time intervals. This thesis added evidence for dissonance related processes playing a role in the question-behaviour effect and posits the possibility of social proof as an underlying mechanism. Lastly, this thesis showed that (un)wanted effects of question-behaviour effect interventions can be attenuated by adding a self-affirmation task to the questionnaire and that goal-difficulty influences the probability of an effect in the desired direction.

APPENDIX I: TEMPLATE INFORMATION SHEET EMPIRICAL STUDIES

University of the West of England
BRISTOL

Information sheet

Why are we doing this research?
In this study we are interested in student behaviour. You can help us by filling in this questionnaire. There are no right or wrong answers; we are only interested in your honest response.

What you have to do
We would like to ask you to fill in this questionnaire. We estimate that filling in this questionnaire will take less than five minutes of your time.

Are there any risks?
We do not anticipate any risks as a result of taking part in this research.

What personal questions will be asked?
The last part of the questionnaire involved answering some demographic questions. Al the data will be anonymised to conceal the identity of the participants.

Are there any restrictions on who can take part?
Anyone who is currently studying at a university can take part.

Please note…
- You have the right to choose not to answer any particular question or complete any part of the study without having to give a reason why.
- You have the right to withdraw from the study at any point.
- All data collected in the study remains strictly confidential, at all times.

How to contact the researcher
If you have any questions about this research, please contact Tommy van Steen (tommy3.vansteen@uwe.ac.uk), doctoral researcher at the University of the West of England.
This study has been approved by the UWE FBL Research Ethics Committee, Ref No: FBL/14/10/07

If you are happy to take part in this study, proceed with the questions on the next page. Thank you!

APPENDIX II: BEHAVIOURAL QUESTIONNAIRE ITEMS

Have you ever been to a health club?
Yes No Prefer not to say

If you have, how many times have you been to a health club in the last month?
0 1 2 3 4 5 6 7 8 9 10 10+

Have you ever flossed your teeth?
Yes No Prefer not to say

If you have, how many times have you flossed your teeth in the last week?
0 1 2 3 4 5 6 7 7+

Have you ever deliberately missed a class?
Yes No Prefer not to say

If you have, how many times have you deliberately missed a class in the last month?
0 1 2 3 4 5 6 7 8 9 10 10+

Have you ever donated blood?
Yes No Prefer not to say

If you have, how many times have you donated blood in the last year?
0 1 2 3 4 5 5+

Have you ever made a bet for money (e.g. on sport results)?
Yes No Prefer not to say

If you have, how many times have you bet for money in the last year?
0 1 2 3 4 5 6 7 8 9 10 10+

Have you ever copied (part of) someone else's work and presented it as your own?
Yes No Prefer not to say

If you have, how many times have you copied (part of) someone else's work in the last year?
0 1 2 3 4 5 6 7 8 9 10 10+

Have you ever cheated on a test?
Yes No Prefer not to say

If you have, how many times have you cheated on a test in the last year?
0 1 2 3 4 5 6 7 8 9 10 10+

Have you ever bought bottled water on campus?
Yes No Prefer not to say

If you have, how many times have you bought bottled water on campus in the last week?
0 1 2 3 4 5 6 7 8 9 10 10+

Do you ever bring your own lunch to campus?
Yes No Prefer not to say

If you do, how many times have you brought your own lunch to campus in the last week?
0 1 2 3 4 5 5+

Have you ever donated money to charity?
Yes No Prefer not to say

If you have, how many times have you donated money to charity in the last year?
0 1 2 3 4 5 6 7 8 9 10 10+

Have you ever bought chocolate bars?
Yes No Prefer not to say

If you have, how many times have you bought chocolate bars in the last week?
0 1 2 3 4 5 6 7 8 9 10 10+

Have you ever walked for more than 30 minutes?
Yes No Prefer not to say

If you have, how many times have you walked for more than 30 minutes in the last week?
0 1 2 3 4 5 6 7 8 9 10 10+

Would you use condoms when you first have sex with a new partner?
Yes No Prefer not to say

If you answered yes, how often have you used condoms to practice safe sex in the last month?
[Slider 0%-100% of the time]

Have you ever had an alcoholic drink?
Yes No Prefer not to say

If you have, how many alcoholic drinks have you had in the last month?
0 1 2 3 4 5 6 7 8 9 10 10+

Do you ever go to bed without brushing your teeth?
Yes No Prefer not to say

If you do, how many times did you go to bed without brushing your teeth in the last week?
0 1 2 3 4 5 6 7

Demographics:

What is your gender?
O Male
O Female
O Other

How old are you?
_____

What type of student are you?

O UK Student
O EU Student
O International Student
O I am not a student

Which university do you go to?
O University of the West of England
O University of Bristol
O University of Bath
O Other
O I don't go to university

APPENDIX III: FILLER TASK

In the following matrix, underline every number 3.

Example:

5 7 3 4 0 5 7 1 3 4

Matrix:

4	0	8	3	4	9	5	1	4	7
9	5	2	6	2	8	4	2	2	6
2	3	5	8	0	5	4	1	3	5
0	9	1	9	3	0	4	8	1	8
2	9	7	3	8	6	9	0	8	2
8	4	0	9	3	6	3	4	7	3
0	2	8	8	7	6	1	1	2	8
3	3	2	2	5	6	5	4	7	0
1	1	4	5	7	0	8	4	8	1
7	4	8	6	4	3	7	5	2	4
0	7	4	6	8	3	2	3	7	5
9	3	4	7	2	2	6	0	0	6
7	4	3	7	2	5	6	8	5	8
6	2	1	8	0	1	5	0	9	8
0	3	0	6	1	1	9	8	9	4
7	3	6	3	2	1	6	6	7	3
0	9	3	2	4	3	1	2	6	3
0	4	6	7	4	4	0	0	7	2
8	6	6	3	5	5	6	1	4	6
8	8	3	0	8	8	7	3	2	8

APPENDIX IV: SOCIAL PROOF QUESTIONNAIRE

Information

In this last part of the questionnaire, we are interested in what you think students here at UWE do. There are no right or wrong answers, it is your opinion that matters to us. You will be asked to answer a few questions about behaviours that students at UWE might or might not engage in. We would like to ask you to answer which percentage of the students you think performs these behaviours. Note: We are not interested in your personal experience with the behaviour, only in what you think other students do.

Please provide the following information about yourself:
Gender: Female / Male **Age: _____**

1) How many students would sing the national anthem when asked to do so over the telephone?

None of the students										All of the students
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
O	O	O	O	O	O	O	O	O	O	O

2) If a member of a cancer charity contacted students to volunteer for a few hours, how many students would do so?

None of the students										All of the students
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
O	O	O	O	O	O	O	O	O	O	O

3) If students were given a take-home exam which explicitly stated that they were not allowed to use text books for the answers, how many students do you think would use the text book to answer the questions?

None of the students										All of the students
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
O	O	O	O	O	O	O	O	O	O	O

4) How many students do you think go to a health club/gym on a weekly basis?

None of the students										All of the students
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0	0	0	0	0	0	0	0	0	0	0

5) If students were given two addressed envelopes and were asked to post these on two different, specified days to investigate the effectiveness of the university's mail system, how many students would do so?

None of the students										All of the students
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0	0	0	0	0	0	0	0	0	0	0

6) If a member of a cancer charity contacted students to fill in a short questionnaire, how many students would do so?

None of the students										All of the students
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0	0	0	0	0	0	0	0	0	0	0

7) If students were offered a free health and fitness assessment, how many students would sign up?

None of the students										All of the students
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0	0	0	0	0	0	0	0	0	0	0

8) If students were asked to take part in a taste test and could choose a healthy option (e.g. a mini rice cake) or an unhealthy option (e.g. a mini chocolate chip cookie) how many students would choose the mini chocolate chip cookie?

None of the students										All of the students
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0	0	0	0	0	0	0	0	0	0	0

9) If the department of marketing offered students a free movie voucher if they would take part in three studies over the course of three weeks, how many students would do so?

None of the students										All of the students
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
O	O	O	O	O	O	O	O	O	O	O

10) If students were offered a free health and fitness assessment, how many students would take part?

None of the students										All of the students
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
O	O	O	O	O	O	O	O	O	O	O

11) If students were asked to be a blood donor, how many students would become a blood donor?

None of the students										All of the students
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
O	O	O	O	O	O	O	O	O	O	O

APPENDIX V: FRUIT AND VEGETABLES ATTITUDE QUESTIONS

Information:
In this part of the questionnaire, we are interested in your opinion regarding eating fruit and vegetables. There are no right or wrong answers, we are only interested in your honest opinion.

1) I like the taste of fruit and/or vegetables.

Strongly disagree			Neither agree nor disagree			Strongly agree
0	0	0	0	0	0	0

2) Eating enough fruit and vegetables fits into my eating habits

Strongly disagree			Neither agree nor disagree			Strongly agree
0	0	0	0	0	0	0

3) Fruit and vegetables are easy to prepare.

Strongly disagree			Neither agree nor disagree			Strongly agree
0	0	0	0	0	0	0

4) Eating enough fruit and vegetables costs a lot of money.

Strongly disagree			Neither agree nor disagree			Strongly agree
0	0	0	0	0	0	0

5) I think it is very important to eat enough fruit and vegetables.

Strongly disagree			Neither agree nor disagree			Strongly agree
0	0	0	0	0	0	0

6) I don’t eat enough fruit and vegetables when I'm low on money.

Strongly disagree			Neither agree nor disagree			Strongly agree
0	0	0	0	0	0	0

7) I eat fruit and vegetables to stay healthy.

Strongly disagree			Neither agree nor disagree			Strongly agree
0	0	0	0	0	0	0

8) I think it is very pleasant to eat fruit and vegetables.

Strongly disagree			Neither agree nor disagree			Strongly agree
0	0	0	0	0	0	0

9) I think it is very healthy to eat fruit and vegetables.

Strongly disagree			Neither agree nor disagree			Strongly agree
0	0	0	0	0	0	0

APPENDIX VI: FIVE-A-DAY INFORMATION

Information:

Here in the UK, the daily amount of fruit and vegetables that you should eat is referred to as '5-a-day.' This means that you should eat 5 portions of fruit and vegetables each day, to stay healthy. If you are not sure what counts as a portion, read the description below.

According to the National Health Service (NHS) some examples of what a portion is can be: two or more small-sized, one piece of medium-sized or half a piece of large fresh fruit; or two broccoli spears or four heaped tablespoons of cooked kale, spinach, spring greens or green beans; or three heaped tablespoons of cooked vegetables; or three sticks of celery, a 5 cm piece of cucumber, one medium tomato or seven cherry tomatoes; or three or more heaped tablespoons of beans or pulses.

Do you predict that you will eat enough portions of fruit and vegetables this week to reach your 5-a-day?

- ○ Yes
- ○ No

Continue with the questions on the next page.

APPENDIX VII: SELF-AFFIRMATION CONTROL TASK

Number: [UNIQUE CODE] Classification of Character Strengths

The following questions are designed to measure the way in which people make judgments about the personal strengths of other people. Please answer the following questions thinking about the qualities **Kim Kardashian** holds. Please choose one option in response to each statement. For some items you may not be sure; however, we are interested in the way in which you guess, so please choose the response that most closely reflects your thoughts. All of the questions reflect statements that many people would find desirable, but we want you to answer only in terms of whether the statement describes what **Kim Kardashian** is like.

We would like you to rate **Kim Kardashian** on the following attributes, guessing where you are not sure. Please be as honest and accurate as possible.

Please provide the following information about yourself:
Gender: Female / Male **Age: _____**

1) Being able to come up with new and different ideas and ways of doing things is one of her strong points.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

2) She is always curious about the world.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

3) She values her ability to think critically.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

4) She loves to learn new things.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

5) Her friends value her good judgment.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

6) She must stand up for what she believes in, even in the face of strong opposition.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

7) She always finishes what she starts.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

8) She always admits when she is wrong.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

9) She is never bored.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

10) She loves what she does.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

11) There are people in her life who care as much about her feelings and well-being as they do about their own.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

12) She goes out of her way to cheer up people who appear down.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

13) No matter what the situation, she is able to fit in.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

14) She can express love to someone else.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

15) She is never too busy to help a friend.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

16) She really enjoys being part of a group.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

17) She treats all people equally, regardless of who they might be.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

18) One of her strengths is helping a group of people work well together even when they have their differences.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

19) She is very good at planning group activities.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

20) She works at her best when she is a member of a group.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

21) She never seeks vengeance.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

22) She does not act as though she is a special person.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

23) "Better safe than sorry " is one of her favourite mottoes.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

24) She controls her emotions.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

25) She never gets side tracked when she works.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

26) She experiences deep emotions when she sees beautiful things.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

27) At least once a day she stops and counts her blessings.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

28) Despite challenges, she always remains hopeful about the future.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

29) She tries to add some humour to whatever she does.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

30) She is a spiritual person.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

31) Her friends can trust her.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

32) She always tries to keep her word.

Very much like her	Like her	Neutral	Unlike her	Very much unlike her
O	O	O	O	O

What is your opinion overall of Kim Kardashian?

Extremely Negative						Extremely Positive
3	2	1	0	1	2	3

APPENDIX VIII: SELF-AFFIRMATION TASK

Number: [UNIQUE CODE] Classification of Character Strengths

Please choose one option in response to each statement, if you are not sure choose the response that most closely reflects your thoughts. All of the questions reflect statements that many people would find desirable, but we want you to answer only in terms of whether the statement describes what you are like. Please be as honest and accurate as possible.

Please provide the following information about yourself:
Gender: Female / Male **Age: _____**

1) Being able to come up with new and different ideas and ways of doing things is one of my strong points.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

2) I am always curious about the world.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

3) I value my ability to think critically.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

4) I love to learn new things.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

5) My friends value my good judgment.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

6) I must stand up for what I believe in, even in the face of strong opposition.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

7) I always finish what I start.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

8) I always admit when I am wrong.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

9) I'm never bored.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

10) I love what I do.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

11) There are people in my life who care as much about my feelings and well-being as they do about their own.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

12) I go out of my way to cheer up people who appear down.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

13) No matter what the situation, I am able to fit in.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

14) I can express love to someone else.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

15) I am never too busy to help a friend.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

16) I really enjoy being part of a group.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

17) I treat all people equally, regardless of who they might be.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

18) One of my strengths is helping a group of people work well together even when they have their differences.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

19) I am very good at planning group activities.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

20) I work at my best when I am a member of a group.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

21) I never seek vengeance.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

22) I do not act as though I am a special person.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

23) "Better safe than sorry " is one of my favourite mottoes.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

24) I control my emotions.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

25) I never get side tracked when I work.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

26) I experience deep emotions when I see beautiful things.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

27) At least once a day I stop and count my blessings.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

28) Despite challenges, I always remain hopeful about the future.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

29) I try to add some humour to whatever I do.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

30) I am a spiritual person.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

31) My friends can trust me.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

32) I always try to keep my word.

Very much like me	Like me	Neutral	Unlike me	Very much unlike me
O	O	O	O	O

APPENDIX IX: FREE FRUIT AND VEGETABLES VOUCHER

Voucher for:
1 free bowl of fruit or vegetables

Valid on [Date] Only!

To be used at Jimmy Deane's Fruit & Veg stand in the central hall of UWE. (Near the bank and cash point.)

Voucher Code: [UNIQUE CODE]

Hand this voucher in at the fruit and veg stand in the central hall of UWE and get a free bowl of fruit or vegetables. *Only one voucher per person.*

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PERSONAL NOTE

On 4 January 2013, I moved to the UK to start my PhD-project at the University of the West of England. This meant getting used to another university, other customs and building a new social life. It also meant adhering to a different approach to what 'counts as a PhD' and how this would be assessed. While I adhered to all the standards and guidelines of the PhD journey in the UK, I would disappoint a lot of people if I would only write a short and formal acknowledgements section as found on page iv of this thesis. Therefore, here, at the end of the thesis, I allow myself some space to 'go Dutch' and write a relatively long, informal personal note. Bear with me.

First and foremost, Adam, thank you for taking me on as PhD student and for all that you have taught me over the years. I have learnt a great deal from you about conducting research and academia in general. I enjoyed our discussions and I am glad you approached my ideas critically. Your skill of being supportive by saying an idea is 'interesting', yet slowly tearing it apart so the whole idea is discarded five minutes later is something I have yet to master. (It has, however, taught me to always come up with more than one idea before our meetings.) I hope we will find ways to keep working together in the future.

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