Individual and Collaborative Implementation Intentions and the Promotion of Breast Self-Examination

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ABSTRACT

Implementation intentions, plans relating to when and where behaviours will be performed, have been effective in increasing health behaviour. Two studies are reported that test the impact of this strategy in promoting breast self-examination (BSE), a behaviour shown to aid the early detection of tumours. In study 1, 457 participants were randomly allocated to either implementation intention or control conditions. Implementation intentions significantly increased likelihood of BSE at one month. The effect of the intervention was marginally significant at six months. Study 2 (N=101) tested the efficacy of a collaborative implementation intention intervention that required female participants to plan, with a partner, collaborative BSE performance. Results indicated that both implementation intentions and partner involvement were associated with BSE performance at one month, whilst the collaborative implementation intention intervention showed a 100% success rate. Collaborative implementation intentions may reduce forgetfulness. Interventions that encourage partner involvement in planning and enacting behaviour appear to enhance implementation intention utility.

Keywords: implementation intentions, collaborative implementation intentions, breast self-examination, partner support.

INTRODUCTION

Breast cancer has been suggested to affect one in nine women during their lifetime (Cancer Research UK, 2004). Self-examinations of the breast and skin, when compared to non-screening, may result in detection of tumours at early stages meaning the tumours are smaller and more likely confined to the breast (cf. Weiss, 2003). The earlier detection of palpable tumours, have been argued to explain the recent reduction in breast cancer mortality (Jatoi & Miller, 2003) whilst Coates et al. (2001) suggest that the majority of breast cancers could be first detected during breast self-examination (BSE). However, recent evidence implies BSE has little impact on mortality rates (Thomas et al., 2002). Despite mixed evidence concerning benefits, BSE is viewed as a means for women to know how their breasts normally feel and to notice any changes and are indexed as an option for women from the age of 20 (American Cancer Society, 2004) with less routine breast awareness encouraged even when BSE is not (e.g. Austoker, 2003). Regardless of possible benefits, only 14-40% of women report performing BSE on a monthly basis (Frank, Rimer, Brogan & Elon, 2000; Morra, 1985; Pinto & Fuqua, 1991; Rutledge, 1987). Although women below 35 years are less likely to develop the disease, their prognosis tends to be worse, partly because of the delay in detection of irregularities (Kroman et al., 2000). Therefore, the development of an intervention that can promote BSE performance, or at least breast awareness, in young adult women is important.

Barriers to BSE

Moore, Barling and Hood (1998) showed that barriers to self-examinations (both breast and testicular) were embarrassment, perceived unpleasantness and difficulty, reliability concerns and worry about what the tests may indicate (see also: Friedman, Neff, Webb & Latham, 1996; Lindberg & Wellisch, 2001). Similarly, lack of knowledge or confidence, have also been cited as barriers to BSE (Erblich, Bovbjerg & Valdimarsdottir, 2000; Friedman et al., 1996; Shepperd, Soloman, Atkins, Foster & Frankowski, 1990). There is clearly a need for intervention, which reduces the unpleasantness of the experience and the lack of BSE knowledge.

Shepperd et al. (1990) showed that a perceived barriers index consisting of forgetting, reliance on medical personnel for examination and low confidence in personal ability to perform BSE accounted for 67% of the variance in BSE frequency. This necessitates a strategy that promotes knowledge for, and reduce forgetting of, BSE. Persson, Ek and

Svensson (1997) provided further evidence for the importance of these two factors by pointing to a general need of women for theoretical and practical knowledge relating to BSE and the ability for women to identify a strategy that enables them to remember to perform self-examination.

Craun and Deffenbacher (1987) demonstrated that the strategy of sending monthly reminders to perform BSE significantly increased the frequency of BSE over educational and demonstration interventions. This study indicated the power of prompts in promoting BSE and provides a method to reduce forgetting, one of the barriers of BSE. However, if this intervention were self-regulatory (i.e. individuals created their own prompt) then an intervention of this type would become more cost-effective.

Implementation Intentions and BSE

Implementation intentions (Gollwitzer, 1993) are a self-regulatory strategy that involves an individual planning when and where they will perform a stated behaviour. They take the form of a statement, "I will do *x*, in place *y*, at time *z*!" (e.g. "I will perform a BSE on my bed exactly one week after the end of my period just before I go to bed"). They help the identification of good opportunities to act by heightening the accessibility of environmental cues (i.e. the bed and the time stated). This heightened accessibility enhances the ease with which an individual can detect and attend to critical environmental triggers (e.g. Aarts, Dijksterhuis & Midden, 1999; Webb & Sheeran, 2004). These environmental features then cue behaviour so that it occurs immediately, efficiently and without conscious awareness such that implementation intentions display features of automaticity (e.g. Brandstätter, Lengfelder & Gollwitzer, 2001) such that, in essence, a cognitive habit has been created from a single mental act (Aarts & Dijksterhuis, 2000; Gollwitzer, 1996). The heightened cue accessibility and automatic triggering of behaviour helps overcome a number of problems of initiating intended behaviour, including BSE.

Orbell, Hodgkins and Sheeran (1997) tested the effect of implementation intentions in promoting BSE over one month. They asked half of their female participants to decide, and subsequently write down, when and where they will perform BSE in the next month, after they completed items measuring their BSE intentions, attitudes, normative beliefs, perceived behavioural control and past behaviour. Their control group answered the same measures but were not given the implementation intention manipulation asking them to plan the

context in which to perform BSE. Despite there being no difference between the two conditions on any measured construct at baseline, 64% of women in the intervention group reported having performed BSE at 1-month follow-up, compared to just 14% in the control condition. Additional analyses on 33 participants who held strong intentions (scoring above the midpoint on the item that measured this construct) revealed that all of the participants in the implementation intention condition (n=14) reported performing BSE at follow-up compared with 53% of the control group (n=19).

Whilst implementation intentions have been argued to have habit-like characteristics and thus maintain their effectiveness over time (Sheeran & Orbell, 1999; Milne et al., 2002), a limitation of Orbell et al.'s (1997) research and many other implementation intention studies is that they fail to test this assumption. Maintenance of healthy behaviour is often essential for health benefits to emerge. There have only been two studies that have assessed the effects of manipulating implementation intention formation on behaviour over more than two months. Of the two exceptions, Sheeran and Orbell's (2000) cervical cancer screening study suggested that implementation intentions were useful in promoting this one-off behaviour over three months, whilst Jackson et al. (2005), who monitored adherence to advice to eat two more portions of fruit and vegetables per day over 90 days, failed to show an effect of implementation intentions. A related study by Luszczynska and Schwarzer (2003) showed that planning, measured through five items, predicted BSE over three months more strongly than intentions and self-efficacy. However, planning was assessed only at follow-up and thus it is possible that participants who performed BSE retrospectively believed that they had planned its action.

There remains a need, therefore, for interventions that do not rely on correlational designs to test the efficacy of implementation intentions over longer time periods. The first study reported here provides an important test of the long-term effectiveness of manipulating the use of implementation intentions as a health-behaviour promotion intervention and monitored the reasons why any participant, regardless of their initial intention strength, failed to perform BSE. Using this information relating to BSE barriers a new, more powerful variant of implementation intentions termed collaborative implementation intentions is presented in Study 2.

STUDY 1

METHOD

Participants

Four hundred and fifty seven female undergraduates (mean age=21.56 years, SD=3.14 years) attending a UK university were recruited at time 1. Of these participants, 83 completed measures at baseline (time 1), one-month (time 2) and six months (time 3), 109 baseline and one-month items only, 37 baseline and six months only, whilst 228 dropped out before time 2. A MANOVA showed there was no significant difference between these four groups of participants in their intentions to perform BSE [$F(3, 444)=1.30$, $p>.05$] and past behaviour [$F(3, 444)=1.90$, $p>.05$]. A second MANOVA indicated that there was no significant difference in the strength of intentions to perform BSE [$F(1, 446)=.26$, $p>.05$] or past BSE behaviour [$F(1, 449)= .002$, $p>.05$] between the implementation intention and control conditions. There was no significant difference in the rate of drop-out across the experimental groups [$\chi^2(3)=2.64$, $p>.05$].

Design and Procedure

This study involved collection of data at three time points (baseline, one month and six months). At baseline, participants were asked to complete a short questionnaire concerning their attitudes to breast cancer and breast self-examinations. They were then randomly allocated to one of two conditions (implementation intention/control), with this group factor representing an independent variable. They completed measures relating to their intentions to perform BSE and past BSE behaviour, along with other items not reported here. At this point, at the end of the questionnaire, the participants in the implementation intention condition read the appropriate manipulation and decided when and where they would perform their BSE. The questionnaires used by all participants differed only in terms of this additional implementation intention manipulation. Participants were contacted by email at time 2 and time 3 and they were requested to respond to an item measuring their BSE behaviour during the experimental period. The key dependent variables were whether (a) the participant had performed a BSE or not and (b) the number of BSE performed. Additionally, at time 2, participants were asked to write down the reasons why they failed to perform a BSE, if they had not done so, to determine BSE barriers and whether implementation intentions help to alleviate them.

Measures

Five items measured *intention* (α=.96) along seven point bipolar scales: 'I intend to carry out BSE in the next month' (unlikely-likely), 'I will carry out BSE in the next month ('definitely will not-definitely will'), 'How likely is it that you will carry out BSE in the next month?' (unlikely-likely), 'I want to carry out BSE in the next month' (strongly disagree-strongly agree) and 'I expect to carry out BSE in the next month' (strongly disagree-strongly agree). These items were summed and a high mean score denotes strong intentions.

Two items assessed *past behaviour*: 'Have you performed BSE in the last month?' (yes/no), and 'How often have you performed BSE in the last six months?' along a seven point scale (never-once a week). Scores on the two scales were standardized and proved reliable (α=.76). Items were summed with higher mean scores denoting greater frequency of past behaviour.

Behaviour at time 2 and 3 was measured with the item ('How many times have you performed BSE since completing the questionnaire?'). This was initially treated as a frequency measure but also collapsed into a yes (performed BSE at least once)/no (didn't perform any BSE) measure. Participants were also asked at time 2: 'If you did not perform BSE please list the reasons why you have not done so'.

Implementation Intention Manipulation

Half of the participants read the following paragraph, taken from Orbell et al.'s (1997) study, relating to the planning of a BSE:

> 'You are more likely to carry out your intention to perform BSE if you make a decision about where and when you will do so. Many women find it most convenient to perform BSE at the start of the morning or last thing at night, in the shower or bath, or while they are getting dressed in their bedroom or bathroom. Others like to do it in bed before they go to sleep or prior to getting up. Decide now where and when you will perform BSE in the next month and make a commitment to do so' (p949).

After this paragraph, there was space which required participants to write down where in the next month they would perform BSE and secondly what time of day they would perform BSE.

RESULTS

Table I indicates the likelihood that participants would perform at least one BSE in the one month prior to intervention (time 1) and at one month (time 2) and six month (time 3) follow-up periods. This is reflected in the table through the percentage and proportion of participants who performed at least one BSE during each of the three time frames. It also illustrates the mean number of BSE carried out during the first month of the study and the mean number of BSE performed at six months. An additional measure of past BSE behaviour, a 7-point bipolar scale (never-once a week, 1-7) rating, is also indexed in the table, along with mean intention strength. All results are shown for the implementation intention and control groups and for the sample as a whole. Standard deviations are presented in brackets where appropriate.

Table I about here

Do implementation intentions increase the likelihood that BSE are performed?

As shown in Table I, implementation intentions were effective in increasing the likelihood of BSE performance at one and six months. Chi-square analyses revealed that statistically more of the sample in the implementation intention condition performed at least one BSE in the one-month experimental period compared to the control group [$\chi^2(1)=7.34$, $p<.01$; $d=.40$[1]]. At six months, the superiority of the implementation intention condition was marginal [$\chi^2(1)=2.06$, $p<.1$, one-tailed; $d=.26$[1]].

Do implementation intentions increase the number of BSE performed?

Independent group t-tests were conducted to compare the number of BSE performed at one-month and six-months across groups. At one month [$t(139.2)=3.38$, $p<.005$[2]; $d=.51$[3]] and

[1] $d= 2\Phi/(\sqrt{(1-(\Phi)^2)})$
[2] Homogeneity of variance assumption was violated. Corrected values are reported.
[3] $d=M_1-M_2/\sigma_{pooled}$

six months [t(118)=1.70, p<.05, one-tailed; d=.31[3]], the implementation intention group significantly outperformed the control group.[4]

Reasons for Non-Performance

Reasons for failure to perform at least one BSE at time 2 are displayed in Table II and analysed across groups using a chi-square test. The number of responses listed, within Table II, does not match the number of participants that failed to perform a BSE during the first month of the experiment. This is due to missing data in the reporting of reasons for not performing BSE.

Table II about here

The most common reason for non-performance, in both implementation intention and control groups, was forgetting. Perceptions of not being at risk represented a common problem and 15 individuals did not see it as a high priority. Fourteen women did not know how to perform a BSE and 4 were afraid of performing a BSE. There was no significant difference across implementation intention and control groups [$\chi^2(5)=1.17$, p>.05; c=.10[5]] in the reasons given for failure to perform a BSE.

DISCUSSION

Implementation intentions were shown to be effective in promoting BSE at one month. However, they were slightly less effective at six months implying that they may be stronger in behaviour promotion than maintenance. Despite this, the effect of implementation intentions at this later time point was important because few studies address the impact of implementation intentions over a half-year period. There was no difference in the reasons given for non-performance across implementation intention and control groups.

Table I indicates that within the control group there was a large increase in the likelihood that BSE will be performed at least once during the experimental period. The quite high

[4] As different behavioural measures were taken at baseline compared to those taken at one-month and six-months a mixed (time x group) ANOVA was inappropriate. However, relevant ANCOVAs with past behaviour as a significant covariate [one month: F(1, 149)=48.32, p<.0005; six months: F(1, 116)=63.74, p<.0005] were performed with a significant effect of group (implementation intentions vs. control) at one-month [F(1, 149)=8.76, p<.005] but no effect at six months [F(1, 116)=1.23, p>.05].

[5] Contingency coefficient value is reported as an index of effect size

attrition rate might artificially increase the rates of BSE across both conditions, with the females not performing BSE over the previous month most likely to dropout. Alternatively, merely asking participants to complete a study related to their BSE action encouraged a number of participants in the control condition to perform a BSE.

The success of implementation intentions supports Orbell et al.'s (1997) findings that they are a useful manipulation for the promotion of BSE. There was no difference in the rates of forgetting in the implementation intention and control groups, thus failing to support past research that implies implementation intentions reduce forgetting (Orbell et al., 1997; Sheeran & Orbell, 1999). Instead, the findings of Study 1 suggests that a strategy designed to reduce forgetting may be effective when used in conjunction with implementation intentions. Reports of lack of knowledge on how to perform BSE points to the need for educational intervention (Erblich et al., 2000; Friedman et al., 1996; Persson et al., 1997; Shepperd et al., 1990), whilst perceptions of being in a low risk group and having higher priorities highlight the problem of low perceived vulnerability. Furthermore, as implementation intentions are self-regulatory in nature and targeted at the individual they tend to ignore the social context, including interpersonal relationships, within which many behaviours are performed. An implementation intention intervention that recognises this social aspect of behaviour might be more effective than an individual-based planning strategy for the promotion of a number of health behaviours including self-examinations. Study 2 tested this proposition and attempted to reduce the impact of the barriers presented.

The second study explored the utility of a novel strategy, namely collaborative implementation intentions, an interpersonal strategy that requires females to decide, with a partner, when and where they will perform a BSE together such that the partner will perform the BSE on their female partner's behalf. In addition, all participants were given a motivational intervention based on Protection Motivation Theory (PMT, Rogers, 1975; 1983). Influenced by threat and coping appraisals, PMT uses persuasive communication with statements that threaten an individual's well-being and provides information about measures that can be undertaken to reduce threat, as a means to increase intentions to engage in precautionary behaviour. Past research has shown the effectiveness of this motivational strategy in relation to self-examinations (Rippetoe & Rogers, 1987; Seydel, Taal & Wiegman, 1990, Steffen, 1990). By enhancing motivation by increasing relevant factors including perceived vulnerability, the intervention should help to overcome the major barriers of viewing oneself at low risk and having greater priorities. Furthermore, all

participants received instructions explaining how to perform BSE to rectify the problem of lack of knowledge.

STUDY 2

Social support has been shown to positively relate to BSE (Jacob, Penn & Brown, 1989). More relevant to partner support specifically, Finney, Weist and Friman (1995) illustrated that participants who received specific social support instructions to recruit a person who could encourage them to perform testicular self-examination (TSE) showed high adherence to recommended levels of examination and recently Weinstock et al. (in press) indicated that partner involvement was strongly associated with thorough skin self-examination, performed for the early detection of melanoma. Translating this to BSE, deciding to perform BSE with a partner should improve the likelihood of performing BSE.

The benefits of a joint intervention

Gillholm, Ettema, Selart and Garling (1999, Study 2), in an attempt to improve implementation intention effects by increasing the depth of planning, asked a group of participants to write down all of the tasks that they had to perform that day. In addition, this group (termed the 'plan condition') decided when and where they would write and mail back an essay. An implementation intention only group (who did not write down all of the tasks that they needed to perform that day) mailed back significantly more essays than the plan and control conditions. They attributed this weaker effect of planning to significantly smaller ratings of anticipated fun and interest, possibly arising as a result of stress incurred after realising what other tasks had to be performed on that day. This pointed to the importance of perceived enjoyment and interest in goal pursuit and how negative fluctuations in these variables can break implementation intention effects. Research by Koestner, Lekes, Powers and Chicoine (2002) supports this. They indicated that implementation intentions were more effective in promoting performance of weekend goals and New Years resolutions when their goals were self-concordant thus reflecting personal interests and values rather than reasons such as social pressures or financial gain. By making the process of breast examination more enjoyable by planning for a partner to perform the examination, the chance of implementation intention effects failing through negative changes in perceived enjoyment and interest would diminish. Therefore, the effects of a combined partner support and implementation intention intervention should be particularly effective in promoting BSE.

It should be noted that collaboration has been shown to have negative effects on memory, termed collaborative inhibition. As Basden, Basden, Bryner and Thomas (1997) argue, each member of a collaborative group, if allowed to recall alone, would use their own retrieval strategy. If they are exposed to another person's recall, their retrieval strategy becomes disrupted, having a negative effect on recall. However, there is evidence that suggests collaborative implementation intentions should not have a negative effect on memory. Basden, Basden and Henry (2000) showed that collaborative inhibition occurred in four person groups but not for pairs. Furthermore, if people are forced to use an organized retrieval strategy then collaboration does not inhibit recall (Basden et al., 1997). In addition, when collaborators are tested individually (Basden et al., 2000), and as argued by Schaefer and Laing (2000) part of a close social group and motivated to perform the behaviour (see activation views of prospective memory; Einstein & McDaniel, 1996; Guynn, McDaniel & Einstein, 1998), collaboration should *benefit* remembering. In the context of this experiment, where two individuals try not to forget to perform a BSE, this study in effect tests the collaborative group individually. This is because if one motivated individual (who is socially close to another) remembers to perform BSE, the behaviour should be promoted. Therefore, using two closely related and motivated individuals who collaborate in planning when and where to perform BSE should reduce forgetting to perform BSE and increase behavioural enactment.

At time 1a, all participants were asked to complete PMT, and other relevant, measures before the administration of a PMT motivational intervention and reading an information sheet concerning how to perform a BSE. This was to provide implementation intentions with a context that encourages their effects on behaviour to emerge (cf. Orbell et al., 1997; Milne, Orbell & Sheeran, 2002). Following this, participants were allocated to experimental groups. Participants subsequently completed the PMT measures again (time 1b). One month later all participants were asked whether they had performed a BSE (time 2).

It was predicted that implementation intentions would be effective in increasing BSE; partner involvement, as a means of social support, will increase behaviour frequency, making it more enjoyable and thus accentuate implementation intention effects; whilst collaborative implementation intentions were anticipated to be the most useful BSE intervention, in part, via reduced forgetting.

METHOD

Participants

Two hundred and fifty female students received a questionnaire that included time 1a and 1b measures and a PMT manipulation similar to that used in previous research (see Rippetoe & Rogers, 1987). One hundred and one of these questionnaires were returned, reflecting a response rate of 40.4%. Of those completing baseline measures, 91 students answered questions one month later at time 2. This reflected a response rate of 90.1%. The mean age of the final sample was 22.05 years (SD=4.08). Of the 101 people returning time 1a and 1b measures, 15 women were from the partner implementation intention condition, 42 from the single implementation intention group, 21 were in the partner control condition and 23 were in the single control group. Of the 10 women who failed to complete time 2 measures, 7 were in the single implementation intention group and 3 were in the partner control group. Chi-square analyses showed that there was no difference in the rate of drop-out across the four groups [$\chi^2(3)=6.78$, $p>.05$]. MANOVA indicated a lack of statistically significant differences between those who dropped out and those who remained in the study [$F(10, 89)=.77$, $p>.05$] or across the four experimental groups [$F(30, 267)=0.81$, $p>.05$] on baseline measures of intention, past behaviour, anticipated enjoyment or PMT constructs.

Design

A 3 (time: 1a, 1b and 2) x 2 (group: implementation intention vs. no implementation intention) x 2 (partner: decision to perform alone vs. with partner) mixed design was used, with independent groups measures on the second and third factors and time reflecting a repeated measures variable. Participants were randomly allocated to 'implementation intention' or 'no implementation intention' groups. However, allocation to groups was not fully randomised. Participants with a partner who decided that they wanted their partner to perform the BSE for them were allocated to the 'partner' condition, whilst females who were single, or had a partner but chose to perform the BSE alone, were allocated to the 'no partner' condition. The key dependent variable, measured at time 2, was whether participants had undergone breast self-examination.

Participants completed measures relating to their decision to perform the BSE alone or with their partner and participants in the implementation intention condition formed an implementation intention between time 1a and time 1b measures, to permit assessment of the effects of implementation intention on motivation.

All participants were asked to read an information sheet explaining how to perform BSE, to avoid the important barriers of lack confidence or knowledge regarding how to perform BSE (Erblich et al., 2000; Friedman et al., 1996; Shepperd et al., 1990). In addition a PMT intervention was employed to help elicit implementation intention effects (see Orbell et al., 1997; Prestwich, Lawton & Conner, 2003; Quine, Rutter & Steadman, 2003).

Procedure

Participants completed time 1a measures then read the PMT manipulation. After reading this manipulation, participants were asked to read through an information sheet explaining how to perform a BSE. They were then assigned to a single/partner condition and the people in the implementation intention group formed a plan relating to BSE in the next month, either alone or with their partner depending on their single/partner group. Following this, all participants completed the time 1b (post-manipulation) items. The time 1b questionnaire was identical to the time 1a questionnaire except that the questions relating to past behaviour and age were not repeated. One month later, participants were contacted by email and asked to complete the enclosed time 2 questionnaire.

Measures

In addition to the items that assessed PMT related constructs, two items reliably assessed *intention* (alpha=.94): 'I intend to perform a breast self-exam in the next month' (strongly agree-strongly disagree) and 'I will perform a breast self-exam in the next month' (strongly agree-strongly disagree). A single item measured *anticipated enjoyment* ('For me to perform a breast self-exam in the next month would be enjoyable-unpleasant'). The items: 'I have performed a breast self-exam before' (never-weekly) and 'I have performed a breast exam in the last month' (never-weekly) assessed *past behaviour* (alpha=.84) at time 1a only. Intention, anticipated enjoyment and past behaviour were measured on 1 (low)-7 (high) bipolar scales. *Time 2 behaviour* was assessed by asking participants whether they had had a breast examination in the past month (yes/no).

Implementation Intention Instructions

Participants in the single implementation intention condition read the following information to encourage them to form a plan relating to their BSE performance and then rehearse it in their heads five times.

> 'You are more likely to perform a breast self-examination in the next month if you make a decision now about where and when you will do so. For example, in the bathroom after a shower in morning before getting dressed. Please indicate below where and when you will perform a breast self-examination in the next month. Please write this in sentence form (e.g. I will perform a BSE on (day) at (time) in (place)).'

Females in the partner + implementation intention condition read the following instruction. Some of the single + implementation intention group also read part of these instructions based on them having partners but deciding to perform the BSE alone:

> 'You are more likely to perform a breast self-examination in the next month if you make a decision now about where and when you will do so. For example, in the bathroom after a shower in morning before getting dressed.
>
> You are also thought more likely to perform a BSE if you arrange for you and your partner to do it together, so that your partner performs the breast exam for you.
>
> If you would prefer to perform the BSE yourself, please complete part i (i.e. the single + implementation intention manipulation) rather than part ii.
>
> Please **consult your partner** and then indicate below where and when you and your partner will perform a breast exam in the next month.
>
> Both of you please write this below in sentence form (e.g. We will perform a breast self-exam on (day) at (time) in (place)).'

Both female participants and their partners were asked to read this sentence in their heads five times.

Control Instructions

At the same time as the participants in the implementation intention groups were given their instructions relating to the formation of their plan, the groups not forming an

implementation intentions were asked: 'Do you currently have a partner?' If they answered 'yes', they were directed to a page with the statement 'You may consider performing a breast self-examination with your partner, so that they perform the examination for you'. Participants were then asked to decide whether to perform the breast examination alone or with their partner and to indicate their decision on the questionnaire. They then completed the rest of the questionnaire.

Participants who responded 'no' to the question, 'Do you currently have a partner?' were instructed to continue with the questionnaire.

RESULTS

Table III shows the intention strength, anticipated enjoyment, past behaviour and behaviour of the experimental groups. Standard deviations are presented in brackets where appropriate.

Table III about here

Whilst 26% of control group participants performed BSE after receiving only instructions on how to perform BSE and the PMT information, the main interventions produced higher rates of BSE behaviour. Sixty three percent forming an implementation intention to perform BSE alone were successful, compared to 83% who decided to perform the examination with their partner. Combining both of these strategies, by forming an implementation intention to perform the examination with a partner, appeared particularly useful as all of the females in this group underwent examination.

Chi-square analyses showed that there was a significant difference in the proportion of individuals who performed BSE across groups [$\chi^2(3)=25.64$, $p<.0005$; $c=.47$[6]]. Furthermore, there was an effect of implementation intentions [$\chi^2(1)=5.06$, $p<.05$; $d=.49$[7]] such that those forming an implementation intention were more likely to perform a BSE than those who did not (74.0% vs. 51.2%), and an effect of partner [$\chi^2(1)=16.54$, $p<.0005$; $d=.94$[8]] with females choosing to involve their partner in the BSE significantly more likely to have a BSE than those who decided to perform it alone (90.1% vs. 48.3%). Chi-square

[6] Contingency coefficient value is reported as an index of effect size
[7] $d= 2\Phi/(\sqrt{(1-(\Phi)^2)})$

analyses, ran separately on those females who decided to perform the BSE alone or with their partner, suggested that implementation intentions were helpful for females performing BSE alone [$\chi^2(1)=7.52$, $p<.01$; d=.77[7]] but not for those who chose to involve their partner [$\chi^2(1)=2.75$, $p>.05$[8]; d=.60[7]].

What predicts BSE performance?

Two hierarchical logistic regressions using time 2 behaviour as the dependent variable were performed to test which variables significantly predicted BSE. The first regression detected main effects of implementation intentions [$Wald^2=9.25$, $p=.002$] and partner involvement [$Wald^2=15.91$, $p<.0005$] but there was no implementation intention x partner interaction. The overall model was significant [$\chi^2(3)=30.39$, $p<.0005$] and correctly classified 75.8% of the participants.

A second hierarchical logistic regression detected time 1b intention [$Wald^2=3.39$, $p=.07$] and past behaviour [$Wald^2=3.43$, $p=.06$] as marginal predictors of behaviour, on the first step, with those holding stronger intentions or having performed BSE more frequently in the past, more likely to have performed BSE during the intervention period; whilst, on the second step, implementation intentions [$Wald^2=7.38$, $p<.01$] and partner involvement [$Wald^2=13.77$, $p<.0005$] remained statistically significant.[9] The overall model was significant [$\chi^2(5)=34.62$, $p<.0005$] and correctly classified 77.8% of the participants. The results of the regression analyses are summarised in Table IV.

Insert Table IV about here

Effect of PMT, Implementation Intentions and Partner Involvement on Motivation and PMT Constructs

Separate 2 (group: implementation intention/control) x 2 (partner: yes/no) x 2 (time: 1a/1b) mixed ANOVAs were performed to determine the effect of the interventions on motivation

[8] Fisher's exact test reported as 50% of cells had expected count less than 5.

[9] When logistic regression is performed on data with an empty cell the results often become unstable. The inflated standard errors on the final step of regressions A and B reflect this and might have been responsible for the failure to detect a significant interaction between implementation intentions and partner involvement. However, running the equivalent linear regression failed to identify such an interaction, therefore, the lack of significant interaction might be more appropriately attributed to a ceiling effect arising from the large impact of partner involvement on BSE.

and other PMT variables. Main effects of time showed that the PMT manipulation significantly increased intention strength [$F(1, 96)=68.57$, $p<.0005$; partial $\eta^2=.42$], perceived vulnerability [$F(1, 97)=15.99$, $p<.0005$; partial $\eta^2=.14$], self-efficacy [$F(1, 97)=32.43$, $p<.0005$; partial $\eta^2=.25$], response efficacy (items 1 [$F(1, 97)=6.08$, $p<.05$; partial $\eta^2=.06$] and 2 [$F(1, 97)=9.78$, $p<.005$; partial $\eta^2=.09$]) and marginally increased perceived severity (item 1 only [$F(1, 97)=3.74$, $p=.06$; partial $\eta^2=.04$]). For intention strength, there were marginal effects of group [$F(1, 96)=3.79$, $p=.06$; partial $\eta^2=.04$] qualified by a marginal group x time interaction [$F(1, 96)=3.35$, $p=.07$; partial $\eta^2=.03$] suggesting that implementation intentions significantly increased intention across time. Although there was a marginal effect of partner [$F(1, 96)=3.88$, $p=.05$; partial $\eta^2=.04$] showing the participants who chose to involve their partner had stronger intentions, this was not qualified by a partner by time interaction [$F(1, 96)=1.27$, $p>.05$; partial $\eta^2=.01$]. There was a marginal three-way interaction [$F(1, 96)=3.40$, $p=.07$; partial $\eta^2=.03$]. One-way ANOVAs revealed no difference at time 1a [$F(3, 96)=1.70$, $p>.05$; partial $\eta^2=.05$] but a significant effect at time 1b [$F(3, 97)=3.31$, $p<.05$; partial $\eta^2=.09$]. Bonferroni post-hoc tests revealed that the partner + implementation intention joint intervention group had significantly stronger intentions than the control group ($p<.05$). There were no main effects of partner or implementation intentions on any other PMT variable and the only significant interaction was a significant group by time interaction on response costs [$F(1, 97)=3.99$, $p<.05$, partial $\eta^2=.04$] such that those forming implementation intentions compared against those who did not form a plan increased their level of response costs across time.

Does deciding to involve a partner increase anticipated enjoyment?

A 2 (partner: yes/no) x 2 (time: 1a/1b) mixed ANOVA with anticipated enjoyment as the dependent variable revealed a main effect of partner [$F(1, 97)=21.68$, $p<.0005$] that was qualified through a partner by time interaction [$F(1, 97)=17.05$, $p<.0005$]. This revealed that deciding to involve a partner in the planning and action of BSE, rather than to plan and perform the BSE alone, significantly increased ratings of anticipated enjoyment over time. A mediational analysis (cf. Baron and Kenny, 1986) was conducted to determine whether increases in anticipated enjoyment explained the effect of partner involvement on behaviour. The analysis revealed that increased anticipated enjoyment did not mediate the relationship between partner involvement and BSE.

Do collaborative implementation intentions significantly reduce forgetting?

Although the reasons for non-performance of BSE were not monitored in this study, a comparison of the rate of forgetting in the partner implementation intention condition in Study 2 (0/15=0%) and in the implementation intention group in Study 1 (15/95=16%), suggests that forming an implementation intention with a partner significantly reduces the likelihood of forgetting to perform a BSE [$\chi^2(1)=2.74$, $p<.05$, one-tailed; $d=.32$[8]].

DISCUSSION

Study 2 demonstrated that female students who decided to perform breast examinations with their partners were significantly more likely to perform BSE behaviour. Planning when and where to perform the BSE also increased the probability of BSE performance. Although forming an implementation intention with a partner did not significantly improve the likelihood of breast examination over the single interventions, as reflected in the non-significant group interaction, its potential as a powerful intervention was underscored with a 100% success rate.

The impact of partner involvement should not be downplayed as its effect on behaviour was greater than forming an implementation intention to perform the BSE alone. The stronger effects of the partner (no implementation intention) group over implementation intention (single), suggests that a largely motivational intervention, motivational in the sense that it changes motivation type rather than strength, can be stronger than volitional strategies. However, the 100% success rates of the joint intervention points to the synergy of such techniques and separate motivational and volitional stages of goal striving (Heckhausen, 1991). Furthermore, if partners help to plan when and where the BSE will be performed (whether in the partner + implementation intention or the partner control condition), the partner-based intervention may be viewed as volitional.

Whether the social support, or the physical involvement of the partner, or both, was important was not testable within the study. Past research has pointed to the important role of social support (Jacob et al., 1989) but this study, to the knowledge of the authors, is the first to examine the potential importance of partner action in breast examination. Although deciding to involve a partner significantly increased ratings of anticipated enjoyment there was no evidence that enjoyment was the mechanism through which partner involvement impacted on behaviour.

An alternative explanation for the effects of partner involvement is that people with partners differ in important ways to those without partners and such individual differences might increase the likelihood of BSE rather than the intervention. Although it is possible that people with partners and those without partners differ in ways that affect BSE performance, it should be noted there were no significant differences across experimental groups at baseline in intention, anticipated enjoyment, PMT constructs (perceived severity, perceived vulnerability, response costs, response efficacy and self-efficacy) and, importantly, past behaviour. Further research should disentangle the reasons for the success of partner involvement and determine whether support or action is the key component.

Comparing results across the two studies it appears that collaborative implementation intentions reduce forgetting of BSE performance more than standard implementation intentions. In addition, the heightened accessibility of environmental cues, a mechanism responsible for standard implementation intention effects, could be experienced by two people within a collaborative implementation intention, and thus might be more likely to detect the good opportunity to act than one individual. Further studies need to use controlled, experimental settings to directly test these mechanisms. However, on the basis of the findings of studies 1 and 2, collaborative planning appears an important strategy in addressing the problem of forgetting to perform BSE (Persson et al., 1997; Shepperd et al., 1990). Given the success of forming an implementation intention with a partner, it appears that such planning does not upset their automatic effects and does not lead to collaborative inhibition. One further possible means through which collaborative planning promotes behaviour is that two people planning the context in which to perform a BSE might result in the selection of a more appropriate context to act than one individual deciding alone.

The motivational effect of implementation intentions adds weight to the argument that such plans can improve one's intentions to act (Dholakia & Bagozzi, 2003, Study 1). This is important, as the motivational impact of implementation intentions has been disputed (Brandstätter et al., 2001, Study 1; Gillholm et al., 1999, Study 2; Gollwitzer & Brandstätter, 1997, Study 2; Koole & Van't Spijker, 2000; Milne et al., 2002; Orbell et al., 1997). If indeed these plans do motivate behaviour, it is unlikely that this improvement in motivation strength underlies the effect of implementation intentions on behaviour, as there has been no evidence that motivation mediates the implementation intention-behaviour relationship.

GENERAL DISCUSSION

These two studies attempted to promote BSE behaviour as such acts can improve the probability of detecting abnormal lumps at an earlier (cf. Weiss, 2003), and thus healthier, stage (Jatoi & Miller, 2003). The low level of performance in the control groups points to the need for intervention. Implementation intentions appear a useful intervention across both studies and its effects could be enhanced with partner involvement (Study 2). The effectiveness of the collaborative implementation intention strategy should encourage its application to a range of other important health behaviours such as exercise and healthy eating.

Although enjoyment failed to mediate the effect of partner involvement on behaviour in the initiation of behaviour over 1 month, the increase in anticipated enjoyment might help a collaborative intervention maintain changes in behaviour. The incorporation of a longitudinal design over a period of time similar to that employed in Study 1 would have provided a valuable test of whether collaborative implementation intentions can maintain the performance of healthy behaviours. The central aim of the second study was to present a novel intervention for changing health behaviour and highlight possible mechanisms through which they affect behaviour. Future research should further test the applications of collaborative implementation intentions, the mechanisms through which it has its effects and whether or not it is more successful in the maintenance of behaviour.

It might be argued that the effects of implementation intentions over the control group in both studies arise from participants within the implementation intention condition thinking more about performing BSE. This could mean that the impact of planning might result from heightened accessibility of the focal behaviour rather than the heightened accessibility of environmental cues and automaticity, which are the mechanisms proposed by past research (e.g. Aarts et al., 1999; Brandstätter et al., 2001). Whilst the studies presented here did not employ a condition whereby participants thought about performing the behaviour for the same amount of time that it took for those in the implementation intention condition to form a plan, previous studies that have requested participants in the control group to change the behaviour in question but still obtained a significant effect of implementation intentions (e.g. Dholakia & Bagozzi, 2003; Murgraff, White & Phillips, 1996) suggest that this proposed mechanism is unlikely.

Finally, we should highlight some problems with the reported studies. First, it is worth noting that within Study 1, in part, because of using the combination of a student population and six-month longitudinal design causing some of the participants to be non-contactable at follow-up via email, there was a high attrition rate. While the attrition analyses indicate that this did not unduly bias the results such rates of attrition might be worrying in relation to developing a practical long-term intervention. However, using this strategy as part of a public health intervention that targets individuals via general practices, where the source may be perceived as more credible, dropout rates would be anticipated to be lower. Second, it is possible that the manipulation, by including the phrase "you are more likely to carry out your intention to perform BSE if you make a decision about where and when you will do so" and requesting that participants make a BSE commitment, raises the risk of demand characteristics. Although feasible, it is unlikely that this is sufficient to explain the effects of implementation intentions on behaviour as numerous implementation intention field-based studies obtained a significant effect of the intervention without using these phrases (e.g. Murgraff et al., 1996; Prestwich et al., 2003). Third, Study 2 did not request participants to list reasons for non-performance. Although all of the participants within the collaborative implementation intention performed BSE, asking all of the participants in Study 2 the reasons why they did not self-examine would have significantly improved the latter study. It would have allowed further analyses of the mechanisms through which implementation intentions, partner involvement and collaborative implementation intentions change behaviour.

This paper reports two studies that significantly improved BSE performance using a planning strategy called implementation intentions. Study 2 introduced and tested collaborative implementation intention formation. This strategy was shown to be potentially more useful than standard implementation intentions, as all of the women involved in such planning subsequently performed BSE. Such interventions may prove valuable in reducing mortality rates by improving chances of early detection of breast abnormalities.

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Table I: BSE behaviour at baseline, one-month and six-month time points (Study 1)

	Time 1 (baseline)			*Time 2 (one month)*		*Time 3 (six months)*	
Condition	Intention	Past Behaviour	Likelihood	Likelihood	Mean BSE	Likelihood	Mean BSE
Implementation Intention (overall)	4.62 (1.65)	.01 (1.83)	19.5% (47/241)	44.7% (46/103)	.81 (.98)	69.6% (48/69)	2.55 (3.76)
Control (overall)	4.68 (1.52)	-.02 (1.75)	15.9% (34/214)	25.8% (23/89)	.38 (.57)	56.9% (29/51)	1.57 (1.96)
Total	4.65 (1.59)	.00 (1.79)	17.8% (81/455)	35.9% (69/192)	.62 (.85)	64.2% (77/120)	2.13 (3.15)

Table II: Frequency (and percentage) of reasons given for non-performance of BSE at one month across implementation intention and control groups (Study 1)

Reason	Condition	
	Control	Implementation Intention
Not in high risk group	15 (25.9%)	13 (26.0%)
Forgot	19 (32.8%)	15 (30.0%)
Had more important things to do	8 (13.8%)	7 (14.0%)
Didn't know how to perform a BSE	7 (12.1%)	7 (14.0%)
Fear of finding something	3 (5.2%)	1 (2.0%)
Other	6 (10.3%)	7 (14.0%)

Table III: Descriptive statistics across groups (Study 2)

Condition	*Intention*		*Anticipated Enjoyment*		*Past*	*Performed BSE (Did not perform BSE)*	
	Time 1a	Time 1b	Time 1a	Time 1b	*Behaviour*	Frequency	Percentage
Implementation Intention + Partner	5.23 (1.71)	6.63 (.72)	4.20 (1.01)	5.13 (1.30)	4.33 (2.18)	15 (0)	100 (0)
Implementation Intention + No Partner	4.74 (1.88)	5.93 (1.30)	4.02 (4.00)	4.00 (.73)	3.14 (1.70)	22 (13)	63 (37)
No Implementation Intention + Partner	5.24 (1.48)	5.79 (1.43)	4.10 (.89)	5.33 (1.24)	3.21 (2.22)	15 (3)	83 (17)
No Implementation Intention + No Partner	4.17 (1.47)	5.39 (1.16)	3.65 (.78)	4.00 (.95)	2.87 (1.63)	6 (17)	26 (74)

Table IV: What predicted BSE? Summary of Logistic Regression Statistics (Study 2): Unstandardized beta values (standard errors in brackets)

Regression	Step	Implementation Intentions (yes/no)	Partner Involvement (yes/no)	Implementation Intentions x Partner Involvement	Past Behaviour	Time 1b Intention
1.	1	1.72*** (.57)	2.94*** (.74)			
	2	1.57** (.59)	2.65*** (.79)	18.03 (10377.78)		
2.	1				.25* (.14)	.37* (.20)
	2	1.62** (.60)	2.88*** (.78)		.28* (.17)	.18 .21
	3	19.18 (10099.84)	19.18 (10099.84)	17.69 (10099.84)	.18 .21	.27 .17

Note: *p<.1; **p<.05; ***p<.005