Motivational and Volitional Processes in Action Initiation: A Field Study of the Role of Implementation Intentions

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A field study tested Gollwitzer's (1993) proposition that the formation of implementation intentions specifying action opportunities accounts for the speed with which intentions are translated into action. Motivation to resume functional activity was assessed among a general population sample of patients prior to joint replacement surgery. At 3 months following surgery, people who had formed implementation intentions were found to have initiated 18 out of 32 activities sooner than people who had not formed implementation intentions. This difference could not be attributed to differences in motivation between the 2 groups. Evidence also showed that the formation of implementation intentions mediated the effects of behavioral expectation on speed of action initiation.

A pressing issue for social psychologists is the understanding of processes accounting for the translation of behavioral intentions into action. Important accounts of social behavior, such as the theory of planned behavior (Ajzen, 1985, 1991), suggest that a person's intention to perform a behavior (e.g., “I intend to go swimming regularly”) is the key predictor of behavioral performance. Reviews of the literature suggest that intention is quite a good indicator of behavioral performance in longitudinal studies (e.g., Godin & Kok, 1996; Randall & Wolff, 1994; Sheeran & Orbell, 1998; Sheppard, Hartwick, & Warshaw, 1988), but generally leaves 50% to 60% of the variance unexplained. While someone with positive intentions is more likely to enact a particular behavior than is someone with negative intentions, many people with positive intentions do not behave in accordance with those intentions. For example, Orbell and Sheeran (1998) showed that only one half of women who intended to undergo cervical screening actually did so during a 1-year period.

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Recent theoretical developments have directed attention toward processes that mediate the relation between an intention and its enactment. The present study addresses this issue by investigating the utility of Gollwitzer’s (1993) concept of implementation intentions in translating intentions into action. The study concerns patients’ goal intentions to regain functional activity following a surgical procedure. In particular, the study investigates whether people who supplement their goal intentions to regain functional activity with implementation intentions will enact their intentions sooner than will people who do not form implementation intentions. We also investigate whether the formation of implementation intentions mediates the effects of intention on speed of action initiation.

Theory of Planned Behavior and Behavioral Enactment

According to the theory of planned behavior (TPB; Ajzen, 1985, 1991), behavioral enactment is proximally determined by the formation of a behavioral intention. Intention in turn is determined by attitude toward the behavior, subjective norm, and perceived behavioral control. *Attitude* refers to a person’s positive or negative evaluation of their performing the behavior (e.g., “My going swimming regularly is important/unimportant”). *Subjective norms* refer to people’s perceptions of social pressure to perform the behavior (e.g., “Most people who are important to me think I should go swimming regularly”). *Perceived behavioral control* refers to people’s appraisals of their ability to perform the behavior, and is closely related to Bandura’s (1977, 1986) concept of self-efficacy (e.g., “I am confident that I can go swimming regularly”). Generally speaking, the more positive the attitude toward the behavior, the stronger the subjective norm and the higher the perceived behavioral control, the more likely it is that the person will intend to perform the behavior.

Intention is conceptualized by the TPB as the immediate determinant of behavioral enactment, and mediates the effects of attitude, subjective norm, and, to a lesser extent, perceived behavioral control, on behavior. Behavioral intentions are assumed to summarize a person’s motivation to perform a behavior. Ajzen (1991) states, “Intentions are assumed to capture the motivational factors that influence a behavior, they are an indicator of how hard people are willing to try, of how much effort they are planning to exert, in order to perform the behavior” (p. 181).

Implementation Intentions

While Ajzen (1991) suggests that behavioral enactment can be predicted from the motivational construct, intention, Gollwitzer (1990) and Heckhausen (1991) have argued that the enactment of goal intentions is a two-stage process that
requires not only the development of motivation, but also a second phase of cognitive activity, which the authors term a volitional or implemental stage. This distinction between the development of motivation to enact behavior, which culminates in the formation of an intention, and a second stage, during which plans are made to ensure that one's intention is acted upon, is central to Gollwitzer's (1993) discussion of implementation intentions.

Gollwitzer (1990) and Heckhausen (1991) propose that movement toward a behavioral goal starts with a deliberative or motivational phase in which the costs and benefits of pursuing the goal are considered. This phase culminates in the establishment of a goal intention or decision whether or not to perform the behavior. The deliberative phase parallels Ajzen's (1991) view of intention formation, where a decision regarding the performance of a behavior (the behavioral intention) is predicted by the person's attitude, subjective norm, and perceived behavioral control. Unlike the TPB, however, Gollwitzer and Heckhausen also propose an implemental stage, which is characterized by efforts to promote the initiation of relevant actions via the formation of plans specifying where and when to get started. These plans are referred to as implementation intentions. Implementation intentions are plans specifying where and when one will initiate the behavioral intention (e.g., a goal intention to go swimming regularly during the next month might be supplemented by an implementation intention such as "I will go to the swimming pool on High Street after work tomorrow evening").

Orbell, Hodgkins, and Sheeran (1997) suggest that implementation intentions are likely to be particularly effective in the pursuit of chronic goals and goals that are complex or have been postponed. Bargh (1990) notes that goal intentions that are capable of being enacted in a variety of different ways or whose timing and location are uncertain are unlikely to be enacted, because good opportunities for action are likely to be missed. Five studies have previously demonstrated the effectiveness of implementation intentions in increasing the likelihood of behavioral enactment. Gollwitzer and Brandstatter (1997) present an experimental study in which participants were asked to form a goal intention of writing a report on how they spent Christmas Eve during their Christmas vacations. One half of the subjects were also asked to form implementation intentions concerning when and where they intended to write the report. At follow-up, 71% of students who had formed implementation intentions were found to have completed their reports on time, compared with 32% in the control group.

In a study in the health domain, Orbell et al. (1997) showed that implementation intentions increase the likelihood of translating an intention to perform breast self-examination (BSE) into action. Among women who intended to perform BSE in the following month, 100% of those who formed implementation intentions did so, compared with 53% of those who did not form implementation intentions.
In a third study, also in the health domain, Sheeran and Orbell (1999) showed that people who formed an implementation intention specifying where and when to take a vitamin C pill each day were less likely to miss taking a daily pill during the following 3 weeks than were people who did not form an implementation intention. Similarly, Sheeran and Orbell (in press) showed that 92% of women who formed an implementation intention concerning when and where they would make an appointment for a cervical Pap smear test subsequently attended, compared with 69% in a control group, while Milne, Orbell, and Sheeran (1998) demonstrated that 91% of people who formed an implementation intention concerning when and where to commence physical exercise during the following week subsequently exercised, compared with 29% of a control group.

Importantly, the studies by Orbell et al. (1997) and Sheeran and Orbell (1999) also provide two lines of empirical evidence for the distinctiveness of the motivational construct, intention, and the volitional construct, implementation intention. In both of these studies, motivational variables specified by the TPB were assessed prior to administering an implementation intervention and following the manipulation. Since motivation to perform the criterion behavior was equivalent in the intervention and control groups, and since no differences in intention between the two groups were observed following the intervention, it can be concluded that the differences in behavioral performance observed between the groups in these studies were attributable to the effects of the volitional manipulation.

**Implementation Intentions Cause Intentions to Be Enacted Sooner**

Gollwitzer (1993), Gollwitzer and Brandstatter (1997), and Orbell et al. (1997) have also addressed the issue of why implementation intentions are effective. Implementation intentions appear to ensure that good opportunities for initiating behaviors are not missed because the formation of an implementation intention, which involves mentally rehearsing where and when one will initiate a behavioral intention, effectively forms an association in memory between the intended action and the context for its enactment. It is the linking of specific action plans to specific opportunities for action that accounts for the effectiveness of implementation intentions.

Gollwitzer (1993) showed that participants who formed implementation intentions regarding the time, place, and method they would use to play a game were able to recall their chosen options with near-perfect accuracy. Orbell et al. (1997) and Gollwitzer and Brandstatter (1997) showed that participants in their studies who formed implementation intentions enacted their intentions at the time and place specified in their implementation intentions, supporting the view that planning a behavior produces strong memory traces that are easily accessed. Following this line of reasoning, Orbell et al. went on to demonstrate that
participants who formed implementation intentions to perform BSE were less likely to report forgetting to enact their intention. Gollwitzer (1993) suggests that the association in memory between action plans and context, which accrues from implementation-intention formation, means that behavior will follow as soon as the specified context is encountered. Consequently, implementation intentions should also affect the speed of action initiation. In another study (Gollwitzer & Brandstatter, 1997) subjects who formed implementation intentions to make counter-racist remarks during a discussion were considerably faster in expressing their counterarguments than was a control group that was only asked to identify good opportunities. Making an implementation intention would, therefore, seem to ensure that when an opportunity for action presents itself, it will not only be rapidly detected, but a decisive answer as to whether one should act now or later, or what one should say or do, will be retrieved easily from memory. Action follows swiftly after encountering the specified context for action.

The Present Study

The studies reviewed here provide strong support for the view that the formation of implementation intentions ensures that opportunities to enact goal intentions will not be missed and that, as a consequence, they will be enacted sooner rather than later. However, these studies involve relatively unfamiliar behaviors performed by undergraduates under laboratory conditions, which suggests caution in making generalizations from their findings (Sears, 1986). The present study extends previous work by using a general population sample and testing the role of implementation intentions for an important naturalistic behavior. The first aim of the present study, therefore, is to test the proposition that the formation of implementation intentions leads to earlier enactment of goal intentions among a general population in a field setting.

Our second aim concerns the effects of forming implementation intentions in mediating the effects of intention on behavioral performance. Gollwitzer (1993) suggests that the impact of a goal intention on goal achievement is accounted for by the formation of an implementation intention. This mediation hypothesis, which suggests that intentions should exert no significant influence on behavior when the formation of implementation intentions is statistically controlled (cf. Baron & Kenny, 1986), has not, to our knowledge, been empirically tested. We, therefore, aim to test the proposition that the formation of implementation intentions will mediate the effects of goal intentions on speed of action initiation.

The present study concerns initiation of functional activity (e.g., activities such as washing, cooking, bathing, using public transportation) following joint-replacement surgery. Joint-replacement surgery is performed in order to reduce pain and to increase functional activity and, in the absence of effective primary or
secondary preventive measures, is a well-established treatment for arthritis (Verbrugge, 1990). The operation involves removing affected bone and cartilage and replacing it with an artificial joint made of metal and plastic. Patients undergoing joint-replacement surgery are likely to be highly motivated to commence or recommence independent functional activity since the operation is elective and is performed to reduce disability and dependency. However, patients’ motivation to pursue these activities must be postponed temporarily during hospitalization. Following surgery, patients may hesitate before trying to perform functional activities that they are motivated to resume.

One way of overcoming this problem of getting started in enacting goal intentions is to form implementation intentions concerning when and where to get started. The present study is designed to test the hypothesis that patients who are highly motivated to resume functional activity will do so sooner if they supplement their goal intention with specific implementation intentions concerning what activities they will pursue and where and when they will enact them.

Hypotheses

The aim of the study is to test, in a field setting, the hypothesis that forming implementation intentions accounts for the speed with which action is initiated. In particular, we hypothesize that among participants with similar levels of motivation to resume functional activity, those who form implementation intentions specifying when they will perform particular activities will commence functional activity sooner than will those who do not form implementation intentions. Second, we investigate the hypothesis that the formation of implementation intentions mediates the effects of motivation on speed of action initiation.

Method

Participants and Procedure

Sixty-eight patients who were about to undergo surgical replacement of the hip or knee were recruited from the waiting lists of two hospital departments of orthopedic surgery. Patients having revision surgery or replacement of joints other than the knee or hip were excluded from the study. Participants were initially contacted by the hospital-bed manager, were invited to take part in the study by letter, and were subsequently visited by an interviewer in their own homes. Interviews were conducted approximately 2 weeks prior to admission to the hospital and again 3 months following surgery. Motivational constructs measuring patients’ expectations about activities that they would perform after they had had the operation were assessed during the preoperative interview. At the end of this interview, patients were given booklets in which to record their
implementation intentions. They were instructed that these booklets were for their use during the 13 weeks after they had had the operation, and they were shown how to complete them. At the second interview, 3 months later, behavioral measures were taken and booklets recording plans made during the intervening weeks were collected for analysis.

**Measures**

The TPB has typically been operationalized with respect to the prediction of specific single behaviors, such as "performing breast self-examination" or "going swimming." The dependent measure in the present study was "functional activity." Since this is an aggregate construct (cf. Fishbein & Azjen, 1974), comprising 32 behaviors, all motivational measures were operationalized with respect to a list of 32 behaviors (the complete list of behaviors is shown in Table 2).3

*Independent activity* was defined as activity performed without personal assistance. Time considerations within the interview itself and the relatively elderly age range of the patients involved necessitated the use of 3-point and 4-point response scales. *Attitude*4 toward functional activity was assessed by asking patients to rate how important each of the 32 activities was to them (not at all, quite, very). *Perceived behavioral control* was assessed by asking participants to rate their perceived self-confidence to perform each of the 32 activities (not at all, quite, very). Two measures of normative belief were included. There is some evidence from research conducted from a social comparison theory perspective (Festinger, 1954) that people with arthritis make comparisons with people who do not have arthritis when they wish to establish standards for desired performance of activities, but compare themselves with others who do have the condition when they are experiencing performance difficulties (e.g., Blalock, McEvoy De Vellis, & DeVellis, 1989).

Since the present study concerns the normative beliefs of people with osteoarthritis concerning activities that they were currently having difficulty performing, but that they expected they would perform following treatment, it was decided to investigate their beliefs concerning both other people with the condition and other people without the condition. The first measure, normative belief (people my age), assessed patients' beliefs concerning the proportion of people their age who regularly performed each of the 32 activities. Patients were asked

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3The list of items was designed specifically for the study. Items were drawn from previous scales and particular items (e.g., "Get down and pick something up from the floor") were included because patients reported that they found these activities problematic in pilot work.

4Pilot work was conducted to examine the utility of a number of dimensions of attitude. *Importance* proved the most salient dimension for the patients, producing the most variability and the least likelihood to produce missing data.
IMPLEMENTATION INTENTIONS

To rate each activity on a 4-point scale ranging from 1 (none) to 4 (almost all). The second measure, normative belief (people with arthritis), assessed patients' beliefs concerning other patients with arthritis. Patients rated each of the 32 activities on the same 4-point scale.

Since functional activity for patients with arthritis is determined by disease severity, at least in part (Dekker, Boot, van der Woude, & Bijlsma, 1992; Summers, Haley, Reveille, & Alarcon, 1988), and consequently is not entirely under volitional control, and since our measure of perceived behavioral control specifically assessed self-confidence, rather than external control, a measure of behavioral expectation was used, rather than a measure of intention. Ajzen (1985) and Warshaw and Davis (1985a, 1985b) have shown that for behaviors that are not entirely under volitional control, behavioral expectation is a better predictor of behavior than is behavioral intention. Patients were asked to rate how likely they considered it that they would perform each of the 32 functional activities after the operation on a 3-point scale ranging from 1 (not likely) to 3 (very likely). Behavior prior to surgery was assessed by asking patients how often they currently performed each of the activities on a 3-point scale ranging from 1 (never) to 3 (frequently).

At 3-month follow-up, participants were asked when they had first initiated each of the 32 activities (weeks since surgery, ranging from 0 to 13).

Implementation Intentions

Previous studies have measured the formation of implementation intentions by asking participants to write down where and when they will perform a single behavior (Gollwitzer & Brandstatter, 1977; Milne et al., 1998; Orbell et al., 1997; Sheeran & Orbell, 1999, in press). In the present context, we were concerned to assess the natural formation of implementation intentions with respect to a range of behaviors. Since the formation of implementation intentions regarding several different behaviors was likely to be a gradual process unfolding during the weeks following surgery, a procedure was required that would enable us to assess the formation of implementation intentions over a 13-week period. We developed the following method:

All of the participants in the study were given a booklet providing information about the surgical procedure, which also contained a blank page for each week following surgery. At the top of each page, participants were instructed to specify precisely what activity they intended to pursue during that week and to specify when they would do it. The instruction read, "My goals for this week are? Write down exactly what you are going to do. For example, if you are going to go for a walk this week, write down where and when you are going to walk." Booklets were distributed to patients prior to surgery and were collected at the end of the 3-month interview. This procedure enabled us to establish who had formed
implementation intentions on the basis of whether or not the booklet had been completed.

Results

At 3-month follow-up, data were available at both time points for 64 patients. The average age of the sample was 68.44 years ($SD = 11.08$) and the average weekly income was £103.17 ($SD = £69.31$). Forty percent ($n = 26$) of the sample was male, and 60% ($n = 38$) was female. Just over half of the sample had surgery of the hip (56%, $n = 36$), while the remainder had surgery of the knee. Average symptom duration (length of time elapsed since first reporting symptoms to a medical practitioner) was 82.51 weeks ($SD = 121.75$).

Preoperative Motivation

Reliabilities on the preoperative measures of behavior, attitude, perceived behavioral control, normative belief/people my age, normative belief/people with arthritis, and behavioral expectation were calculated across all 32 behaviors and were all satisfactory (Cronbach’s $\alpha = .85, .87, .95, .95, .95$, and .92, respectively). Initially, we examined the ability of our motivational constructs to predict participants’ expectations concerning functional recovery following surgery. Behavioral expectation was regressed on attitude, perceived behavioral control, and the two measures of normative belief. The regression equation was significant, $F(4, 59) = 32.57, p < .01$, and explained a substantial 62% of variance in behavioral expectations. Significant betas were obtained for attitude ($\beta = 0.53, p < .01$) and perceived behavioral control ($\beta = 0.32, p < .01$). Interestingly, normative belief/people my age was a significant determinant of behavioral expectation ($\beta = 0.29, p < .01$), whereas normative belief/people with arthritis was not ($\beta = 0.05, ns$). A significant bivariate correlation was obtained between expectation and normative belief/people my age ($r = .25, p < .05$), whereas a nonsignificant association was obtained for normative belief/people my age ($r = .02, ns$).

Booklets had been completed by 26 patients at follow-up, giving an implementation-intention group of 26 and a control group of 38 patients who had not formed implementation intentions. The two groups were compared on a range of demographic and health-status characteristics, but we obtained no significant differences between the two groups ($age t = 0.93, ns$; income $t = 0.15, ns$; symptom duration $t = 0.74, ns$; depression$^5 t = 0.68, ns$; pain$^6 t = 0.43, ns$; gender

$^5$Depression was assessed using the Radloff (1977) Center for Epidemiological Studies Depression (CES-D) scale.

$^6$Pain was assessed using a 100-mm visual analogue scale anchored at one end with the words “worst possible pain” and at the other end with the words “no pain.”
Table 1

**Means, Standard Deviations, and Univariate F Tests for Implementation Intention and Control Groups on Preintervention Measures of Motivation**

<table>
<thead>
<tr>
<th>Motivational measure</th>
<th>Implementation-intention group</th>
<th>Control group</th>
<th>Univariate F(1, 62)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral expectation</td>
<td>80.08 (9.63)</td>
<td>76.00 (13.71)</td>
<td>1.72, ns</td>
</tr>
<tr>
<td>Attitude</td>
<td>79.89 (7.40)</td>
<td>76.90 (11.39)</td>
<td>1.39, ns</td>
</tr>
<tr>
<td>Perceived behavioral control</td>
<td>75.89 (14.06)</td>
<td>72.71 (15.59)</td>
<td>0.69, ns</td>
</tr>
<tr>
<td>Normative belief/people my age</td>
<td>107.89 (19.94)</td>
<td>109.50 (16.15)</td>
<td>0.13, ns</td>
</tr>
<tr>
<td>Normative belief/people with arthritis</td>
<td>107.08 (20.14)</td>
<td>110.29 (5.89)</td>
<td>0.86, ns</td>
</tr>
<tr>
<td>Preintervention behavior</td>
<td>68.39 (11.08)</td>
<td>67.24 (12.19)</td>
<td>0.15, ns</td>
</tr>
</tbody>
</table>

*Note.* Standard deviations are shown in parentheses. *ns* = nonsignificant.

\[ \chi^2 = 0.09, \text{ ns}; \text{knee vs. hip joint } \chi^2, = 0.00, \text{ ns}; \text{disease severity } \chi^2 = 0.14, \text{ ns}; \text{and comorbid conditions } \chi^2 = 0.02, \text{ ns}. \]

Scores on the preoperative measures of behavior, attitude, perceived behavioral control, normative belief/people my age, normative belief/people with arthritis, and behavioral expectation among the implementation-intention group and those who had not formed implementation intentions are shown in Table 1. MANOVA showed that there were no significant differences in levels of motivation between the two groups prior to surgery, \( F(6, 57) = 0.67, \text{ ns}. \) Scores on the measure of behavioral expectation for the two groups were above the scale midpoint of 64 (implementation-intention group, \( M = 80.08, SD = 9.63; \) control group, \( M = 76.00, SD = 13.71 \)). These results show that both groups were similarly highly motivated to regain functional activity. Differences in speed of action initiation between the two groups cannot therefore be attributed to different levels of motivation to regain functional activity.

**Speed of Action Initiation**

Our main hypothesis was that patients who formed implementation intentions would commence independent functional activity sooner than patients who did not form implementation intentions. Number of weeks elapsed since surgery

\(^7\text{Disease severity was assessed by multiple- versus single-joint involvement.}\)
before commencement of each of the 32 functional activities is shown for the
implementation-intention group and the control group in Table 2. An aggregate
measure of speed of action initiation was computed by averaging speed of
action initiation across the 32 behaviors for each participant. A significant mean
difference was obtained between the two groups, \( t(62) = 2.71, p < .01 \). Mean
speed of initiation of functional activity for the implementation-intention group
was 6.82 weeks (SD = 2.85) and was 9.27 weeks (SD = 3.96) for the control
group. In aggregate terms, participants in the implementation-intention group
were functionally active 2.45 weeks sooner than were those who did not form
implementation intentions.

To further elucidate these findings, we conducted a two-way repeated-measures
MANOVA with behavior as the within-subjects factor and implementation
intentions as the between-subjects factor. A significant main effect of forming
implementation intentions was obtained across the behaviors, \( F(1, 62) = 7.32, \ p < .01 \), along with a main effect of type of activity, \( F(31, 32) = 25.06, p < .01 \),
and a significant interaction of activity by group, \( F(31, 32) = 2.37, p < .01 \).
Univariate comparisons showed that patients in the implementation-intention
group initiated 18 out of 32 activities significantly sooner than did patients in the
control group. Significant differences in time of commencement of activities
between the two groups ranged from 2.71 weeks (independent light cleaning) to
4.22 weeks (independently wash all over).

While the main effect of type of activity is to be expected, the interaction of
group by activity shows that the effects of forming implementation intentions
differentially influenced speed of action initiation for different activities. Table 2
shows that differences between the two groups were more likely for self-care
activities (e.g., wash, dress) and activities of daily living (e.g., make a meal). Non-
significant differences were obtained for social and community activities, which
also tended to be recovered later. In order to validate these findings, a content
analysis was conducted of implementation intentions specified in the booklets.
The 18 activities that were recovered significantly faster were specified more
frequently (\( M = 8.0 \)) than were the 14 activities for which no significant group
differences were obtained (\( M = 1.4 \)). The most frequently mentioned activities
were: “Walk out of doors” (96% of booklets), “Walk across room” (91%), “Walk
up/down slopes” (86%), “Stand” (68%), “Light cleaning” (64%), and “Make a
meal” (55%). Implementation intentions, therefore, appeared to be particularly
effective in increasing speed of initiation of essential activities for independent
living.

**Do Implementation Intentions Mediate Speed of Action Initiation?**

We used the procedure specified by Baron and Kenny (1986) to test the
proposition that the effects of goal intentions on goal achievement are accounted
Table 2

*Mean Number of Weeks Elapsed Before Initiation of Independent Functional Activity for Implementation-Intention and Control Groups*

<table>
<thead>
<tr>
<th>Functional activity</th>
<th>Implementation-intention group</th>
<th>Control group</th>
<th>Univariate $F(1, 62)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand</td>
<td>3.42</td>
<td>7.68</td>
<td>8.77**</td>
</tr>
<tr>
<td>Climb stairs</td>
<td>5.46</td>
<td>7.97</td>
<td>3.02</td>
</tr>
<tr>
<td>Walk across room</td>
<td>3.69</td>
<td>6.87</td>
<td>4.54*</td>
</tr>
<tr>
<td>Walk out of doors</td>
<td>4.42</td>
<td>8.29</td>
<td>9.18**</td>
</tr>
<tr>
<td>Walk up/down slopes</td>
<td>6.92</td>
<td>10.10</td>
<td>7.85**</td>
</tr>
<tr>
<td>Pick something up from floor</td>
<td>10.58</td>
<td>10.95</td>
<td>0.18</td>
</tr>
<tr>
<td>Get in/out of a chair</td>
<td>2.85</td>
<td>7.18</td>
<td>9.14**</td>
</tr>
<tr>
<td>Get in/out of bed</td>
<td>2.96</td>
<td>6.74</td>
<td>6.39*</td>
</tr>
<tr>
<td>Wash all over</td>
<td>2.81</td>
<td>7.03</td>
<td>7.85**</td>
</tr>
<tr>
<td>Use a bathtub</td>
<td>6.88</td>
<td>6.84</td>
<td>0.00</td>
</tr>
<tr>
<td>Dress</td>
<td>2.85</td>
<td>7.16</td>
<td>9.02**</td>
</tr>
<tr>
<td>Fasten clothing</td>
<td>3.81</td>
<td>7.05</td>
<td>4.56*</td>
</tr>
<tr>
<td>Put on shoes and socks</td>
<td>4.92</td>
<td>8.87</td>
<td>8.69**</td>
</tr>
<tr>
<td>Make a hot drink</td>
<td>4.19</td>
<td>7.76</td>
<td>7.35**</td>
</tr>
<tr>
<td>Make a meal</td>
<td>6.23</td>
<td>8.89</td>
<td>4.87*</td>
</tr>
<tr>
<td>Carry a hot drink/plate of food</td>
<td>6.11</td>
<td>9.05</td>
<td>5.70*</td>
</tr>
<tr>
<td>Light cleaning</td>
<td>8.00</td>
<td>10.71</td>
<td>5.76*</td>
</tr>
<tr>
<td>Heavy cleaning</td>
<td>11.00</td>
<td>11.84</td>
<td>1.07</td>
</tr>
<tr>
<td>Laundry</td>
<td>8.23</td>
<td>10.82</td>
<td>5.47*</td>
</tr>
<tr>
<td>Shop for food</td>
<td>8.96</td>
<td>10.05</td>
<td>1.02</td>
</tr>
<tr>
<td>Shop for nonfood items</td>
<td>10.54</td>
<td>10.92</td>
<td>0.19</td>
</tr>
<tr>
<td>Get in/out of a car</td>
<td>4.38</td>
<td>9.47</td>
<td>16.81**</td>
</tr>
<tr>
<td>Drive a car</td>
<td>10.81</td>
<td>12.21</td>
<td>4.85*</td>
</tr>
<tr>
<td>Use a bus</td>
<td>11.15</td>
<td>11.18</td>
<td>0.00</td>
</tr>
<tr>
<td>Go into town</td>
<td>8.77</td>
<td>9.37</td>
<td>0.31</td>
</tr>
</tbody>
</table>

*(table continues)*
Table 2 (Continued)

<table>
<thead>
<tr>
<th>Implementation -intention group</th>
<th>Control group</th>
<th>Univariate F(1, 62)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive hobbies</td>
<td>3.92</td>
<td>6.79</td>
</tr>
<tr>
<td>Have visitors to home</td>
<td>4.54</td>
<td>8.21</td>
</tr>
<tr>
<td>Go out socially</td>
<td>9.65</td>
<td>10.89</td>
</tr>
<tr>
<td>Visit friends</td>
<td>7.85</td>
<td>9.63</td>
</tr>
<tr>
<td>Go away from home</td>
<td>11.31</td>
<td>12.18</td>
</tr>
<tr>
<td>Community activities</td>
<td>10.31</td>
<td>11.50</td>
</tr>
<tr>
<td>Active hobbies</td>
<td>10.77</td>
<td>12.50</td>
</tr>
</tbody>
</table>

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

Table 3

Mediation Analysis Showing Effects of Forming Implementation Intentions on Speed of Action Initiation

<table>
<thead>
<tr>
<th>β values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable entered</td>
</tr>
<tr>
<td>Expectation</td>
</tr>
<tr>
<td>Implementation intentions</td>
</tr>
</tbody>
</table>

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

for by the formation of implementation intentions. The aggregate measure of speed of action initiation was the dependent measure in these analyses. To demonstrate mediation, behavioral expectation should, on its own, significantly predict speed of action initiation in the first equation, while in a second equation, in which both independent variables are entered, implementation intention should be significant. If implementation intentions mediate the effects of behavioral expectation, behavioral expectation should be reduced to nonsignificance in the second equation. The results of these analyses are shown in Table 3.

The first equation was significant, $F(1, 62) = 3.42, p < .05$, and a significant effect was obtained for behavioral expectation ($\beta = -0.23, p < .05$). The second equation was also significant, $F(2, 61) = 4.85, p < .05$, and a significant effect was obtained for implementation intentions ($\beta = 0.30, p < .01$), while the effects
of behavioral expectation were reduced to nonsignificance (β = -0.18, ns). Thus, implementation intentions mediate the effects of behavioral expectations on subsequent behavior.

Discussion

Gollwitzer (1990) and Heckhausen (1991) have proposed that behavioral enactment requires attention not only to motivational processes in the development of goal intentions, but also to volitional processes concerned with plans to initiate behavior. The present study sought to demonstrate the role of forming implementation intentions on speed of action initiation among a general population sample. The study extends previous work by Gollwitzer and Brandstatter (1997), Orbell et al. (1997), and Sheeran and Orbell (1999), since it was conducted with respect to naturally occurring behaviors among a general population sample, in a health-care context.

Motivation to resume activity was assessed by measures of attitude, normative belief, perceived behavioral control, and behavioral expectation. Prior to surgery, all patients were found to be very highly motivated to resume functional activity. Our main hypothesis was supported; patients who formed implementation intentions regarding specific functional activities were found to initiate 18 out of 32 activities more quickly than were patients who did not form implementation intentions in the weeks following surgery. Furthermore, since there were no differences between the two groups on measures of motivation to perform functional activities, it can be concluded that the effects observed were a result of the volitional variable, and not differences in motivation. The evidence presented here, together with that provided by Milne et al. (1998), Orbell et al. (1997), and Sheeran and Orbell (1999, in press) supports Gollwitzer’s (1993) and Heckhausen’s (1991) contention that understanding the intention–behavior relationship requires attention not only to motivational constructs, as specified by Ajzen’s (1985) TPB, but also to the volitional phase of behavioral enactment.

Our second hypothesis was also supported. When speed of action initiation was regressed on a model including both goal intention and implementation intention, the effects of goal intentions were reduced to nonsignificance. These findings indicate that implementation intentions account for the translation of goal intentions into action. Motivational constructs were operationalized in the present study with respect to the time frame “after my operation.” This time frame permitted assessment of the extent to which patients were motivated to recover activities, and was most appropriate in a context where a number of ethical and clinical issues would have precluded asking preoperative patients to contemplate performing activities within a specific time period, such as “3 weeks after my operation.”
The behaviors studied in the present context were not necessarily novel behaviors to the participants, but considerable uncertainty might have existed for participants about when and where to commence trying these activities following surgery. Gollwitzer (1993) contends that by forming specific plans for action, people effectively commit themselves to performance once the situation or occasion specified in the implementation intention is encountered. For example, the implementation intention, "I will walk to the bus stop to meet my wife from work tomorrow," effectively specifies both the time and place for enactment, thus ensuring that the behavior is performed. Patients in the present study who were equally motivated to recover independent walking, but who did not form such implementation intentions, may not have made a plan committing them to when they would get started. Hence, these patients delayed, on average, nearly 3 weeks longer before doing so. While studies (Orbell et al., 1997; Sheeran & Orbell, 1999) have previously demonstrated that the provision of a volitional strategy augments the ability of a conventionally measured intention to predict behavior (cf. Gollwitzer & Brandstatter, 1997), the present study demonstrates that implementation intentions also influence the speed with which action is initiated within a time frame specified in a goal intention.

A number of limitations of the present study should be acknowledged. The operationalization of TPB constructs was suboptimal, because of time constraints within the interview and the constraints imposed by a relatively elderly population, many of whom were experiencing pain preoperatively. In particular, it should be acknowledged that the present study utilized two measures of normative belief, as opposed to the standard measure of subjective norm specified by Ajzen and Fishbein (1980). Nonetheless, it should be noted that the constructs assessed in the present study were capable of explaining a substantial 62% of variance in behavioral expectations, a figure that is consistent with that obtained from meta-analytic reviews. We do not believe that the somewhat nonstandard measures used here present problems for the theoretical import of the study, since the findings of the present study are consistent with those obtained in previous studies by Orbell et al. (1997) and Sheeran and Orbell (1999, in press), in which standard measures of TPB constructs were used.

It is also of interest to observe that patients’ expectations appeared to be based on their normative beliefs concerning other people of their same age, rather than their beliefs about other people with arthritis. This finding is consistent with Blalock et al.’s (1989) finding that people with arthritis compare themselves with people who do not have arthritis when they wish to establish standards for desired performance.

A second limitation is that the measure of behavior was self-reported. While it would be desirable to have a more objective measure of behavioral enactment, most of the behaviors included here cannot be readily observed, nor could observation take place over a period of 3 months. Moreover, the effects of
IMPLEMENTATION INTENTIONS

Implementation intentions have previously been demonstrated with respect to objectively observable behavioral measures (Gollwitzer & Brandstatter, 1997; Sheeran & Orbell, 1999).

Notwithstanding these limitations, the study has considerable theoretical and applied importance. Many of the behaviors that health professionals wish to promote might be characterized as complex goals (e.g., recover functional activity, get fit, lose weight, reduce stress, increase social support). In order to ensure that these behaviors are performed quickly, these goals require enactment of specific behaviors at specific times. This may be the case particularly for rehabilitation of patients following acute disorders, such as heart attack, although it is also likely to be true of more general health behaviors (e.g., quitting smoking) and indeed a variety of personal and social goals (e.g., decorate the spare room, attend an evening class). These goal intentions may never be enacted unless implementation intentions are formed concerning what behaviors to initiate, and where and when to initiate them. More generally, the study provides a useful starting point for future research and suggests that implementation intentions may provide a valuable strategy for designing interventions to improve the speed of initiation of a range of health and social behavioral goals.

References


