Structural Equation Modeling of Determinants of Implementation Intentions

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Gärling, T., & Fujii, S. Structural equation modeling of determinants of implementation intentions. *Göteborg Psychological Reports*, 1999, *29*, No. 4. The hypothesis is proposed that the formation of an implementation intention or planning is causally related to behavioral intention and perceived behavioral control whereas, in accordance with the theory of planned behavior (I. Ajzen, 1985, 1991), behavioral intention is assumed to be causally related to attitude and perceived behavioral control. Indices of attitude towards the behavior, perceived behavioral control, behavioral intention, and planning intention were constructed from 192 undergraduates´ ratings of descriptions of two fictitious situations in which the target behavior was varied with respect to benefit and actual behavioral control. Structural equation modeling based on the covariances between the measures yielded an acceptable fit of the proposed model including a causal path from attitude to perceived behavioral control. The results are consistent with and extend the findings in several recent studies showing that inducing an implementation intention increases the likelihood that a behavior is performed.

Key words: Decision making, planning, intention.

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The relation between attitude and behavior has been a concern to social psychology for a long time (Dawes & Smith, 1985; Zanna & Fazio, 1982). First the research attempted to demonstrate that such a relation exists. When the relation did not prove to be straightforward, possible moderating factors were investigated (e.g., Ajzen & Fishbein, 1973; Borgida & Campbell, 1982; Davidson & Jaccard, 1979; Wicker, 1969). An outcome of this research was the recurrent finding that *intention* predicts behavior better than attitude. As a consequence, the bulk of subsequent research investigated the relation between intention and attitude (Sheppard, Hartwick, & Warshaw, 1988). Not until recently has the

question of how intentions are implemented in behavior been focussed (Karoly, 1992; Brandstätter & Gollwitzer, 1994).

In the theory of reasoned action (TRA) (Ajzen & Fishbein, 1977, 1980; Fishbein & Ajzen, 1975) and its successor the theory of planned behavior (TPB) (Ajzen, 1985, 1991), it is assumed that an intention to perform a behavior is related to the attitude towards performing the behavior and a subjective norm concerning its performance. Attitude and subjective norm are similarly defined as beliefs about the consequences of performing the behavior, in the former case beliefs about how positively the outcomes are judged and in the latter case beliefs about the degree of approval from important others. The single most important implication of the theory is that intention will predict behavior better than will attitude. This will In particular be true if intention is measured so that it corresponds to the behavioral criterion with regard to action, target, context, and time (see, e.g., Eagly & Chaiken, 1993).

Despite that the TRA over the years has received strong empirical support (Sheppard et al., 1988), attempts have been made to increase its predictive power, either by adding new variables or by making changes to its internal structure (Bagozzi, 1992). In the former category falls the TPB (Ajzen, 1985, 1991), which includes perceived behavioral control as a measure of people's confidence in their ability to perform the behavior. The boundary conditions of TRA is thereby extended to behaviors that are not under complete volitional control. Empirically it has been shown that measures of perceived behavioral control improve predictions of intention from attitude and subjective norm as well as predictions of behavior from intention (Ajzen & Madden, 1986; Gärling, 1992; Netemeyer, Burton, & Johnston, 1991; Schifter & Ajzen, 1985). If perceived behavioral control improves the prediction of behavior, it implies that perceived and actual behavioral control are correlated. Such a correlation may exist if, for instance, a low degree of perceived behavioral control motivates successful attempts at increasing actual behavioral control. From both a theoretical and practical point of view, an important research task is to gain knowledge about how people increase actual control over behavior.

Attitude theories such as TRA and TPB fail to specify how intentions are implemented in behavior. In an attempt to do this, Heckhausen and Gollwitzer (1987) and Gollwitzer (1993) made a distinction between a *goal* intention and an *implementation* intention. The formation of a goal intention is characterized by deliberating desires which may be in conflict with each other. This type of intention specifies a desired end state or goal to which people commit themselves. Hence, possible obstacles to implementation are not taken into account. The amount of commitment associated with the goal intention is furthermore assumed to be related to how attractive or important the goal is.

An implementation intention is formed after commitment has been made to a desired goal. It may entail both a plan of the course of the subsequent goal pursuit as well as when, where, and how the goal-directed behavior is to be enacted. *Planning* is assumed to be an important determinant of the formation of an implementation intention (Gollwitzer, 1996). Under different definitions planning has been the focus of research in many subfields of psychology, such as cognitive psychology (e.g., Hayes-Roth & Hayes-Roth, 1979; Miller, Galanter, & Pribram, 1960), social psychology (e.g., Schank & Abelson, 1977), and

environmental psychology (e.g., Gärling, 1999). An acceptable general definition of planning may be "the predetermination of a course of action aimed at achieving some goal" (Hayes-Roth & Hayes-Roth, 1979, p. 275-276). A theoretical definition needs to specify the psychological factors controlling the decisions about the course of action such as memory retrieval, problem solving, and motivation. Gollwitzer (1993, 1996) has taken a step in that direction in assuming that planning ties the behavior to a situation, thus in a sense transferring the control of the behavior to the situation. Planning may therefore be referred to as "mental practicing" since it is similar to the development of a habit through actual practice.

Gollwitzer and Brandstätter (1997) reported several studies demonstrating an effect of forming an implementation intention on the performance of a behavior. In one study an experimental group was induced to form an implementation intention by specifying time and place for writing an essay, while a control group was not so induced. The results showed that more than twice as many participants in the experimental group returned the written essays on time. Thus, the results clearly supported the hypothesis that forming an implementation intention increases the likelihood that a goal intention will be implemented. Similar results were obtained by Orbell, Hodgkins, and Sheeran (1997) in an experimental field study of women´s breast self-examinations. Gollwitzer and Brandstätter´s results were also replicated in a series of experiments reported in Gillholm, Erdeus, and Gärling (1999a) and Gillholm, Ettema, Selart, and Gärling (1999b). In some of these experiments, undergraduates were requested to read an excerpt from a novel, fill out, and mail back a mood adjective checklist. In other experiments they were asked to write an essay. Participants who were induced to form an implementation intention (e.g., requested to indicate time and place) were more likely to perform the task. Most recently, Sheeran and Orbell (1999) report another study in which students who were asked to take a vitamin pill C every day were more likely to do so when they had been induced to form an implementation intention. Replicating the results of Gillholm et al. (1999a, 1999b), they also showed that participants´ *motivation* (as measured in TPB) did not change with the experimental manipulation of inducing an implementation intention. Thus, this is evidence supporting the distinction between motivation and *volition* made by Gollwitzer (1993, 1996) and others before him (see, e.g., Kuhl & Beckman, 1985).

The conclusion appears warranted that forming an implementation intention increases intention-behavior consistency. However, the studies demonstrating this have not addressed the question of what factors cause subjects to form an implementation intention. Gollwitzer and Brandstätter (1997) note that people may form an implementation intention when they anticipate difficulties in implementing the goal intention. We acknowledge this in hypothesizing that *perceived behavioral control* is one determinant of the formation of an implementation intention. Thus, a person who feels he or she is able to exert control over a behavior is not likely to see any need to increase actual behavioral control through planning (i.e., forming an implementation intention). If this hypothesis is correct, the demonstrations of the effects of forming an implementation intention in previous research would seem curious, Why did the partipcants not form implementation intentions spontaneously. A possibility is

that perceived behavioral control often is spuriously high. This is perhaps related to the overconfidence phenomenon demonstrated in many studies (see, e.g., Kahneman, Slovic, & Tversky, 1982).

We also assert that *motivation* is another determinant of an implementation intention. As Sheeran and Orbell (1999) did, we equate motivation with the strength of a *behavioral* intention. Since in the TPB perceived behavioral control is assumed to be a determinant of behavioral intention, this factor also affects motivation. It seems plausible since having low perceived behavioral control should be negative for the motivation to perform a behavior. At the same time, a low perceived behavioral control should also motivate attempts to increase actual behavioral control (i.e., to form an implementation intention or plan), in particular if one holds a positive attitude towards the behavior which in TPB is another determinant of the behavioral intention[1]. In the previous studies (Gillholm et al., 1999a, 1999b; Gollwitzer & Brandstätter, 1997: Orbell et al., 1997; Sheeran & Orbell, 1999) demonstrating an effect of inducing implementation intentions, attitude toward the behavior (e.g., students writing an essay) was perhaps not positive enough so that an implementation intention was formed spontaneously. Conversely, had the motivation to perform the behavior been stronger, participants in the control groups would presumably have been motivated to form an implementation intention. Inducing the experimental group to do that would then have had no effect.

Our hypotheses about the determinants of an implementation intention are illustrated in Figure 1. Consistent with TPB (Ajzen, 1985, 1991) a positive attitude towards the behavior and perceived behavioral control are assumed to increase the behavioral intention. Furthermore, behavioral intention is assumed to increase and perceived behavioral control is assumed to decrease the likelihood that an implementation intention is formed. These assumptions received support in two experiments conducted by Gillholm and Gärling (1997). Yet, the results were inconclusive since no inferences of the assumed causal relationships between the the latent theoretical variables were possible. In the present study we apply the technique of structural equation modeling (SEM) (Bollen, 1989) in a way so that it allows us to make inferences of the causal relations between attitude, perceived behavioral control, behavioral intention, and implementation intention.

[1]A third component is subjective norm. Although theoretically it may be necessary to include it (but see Pieters, 1988), it is not important to do so here given the type of data we have collected.

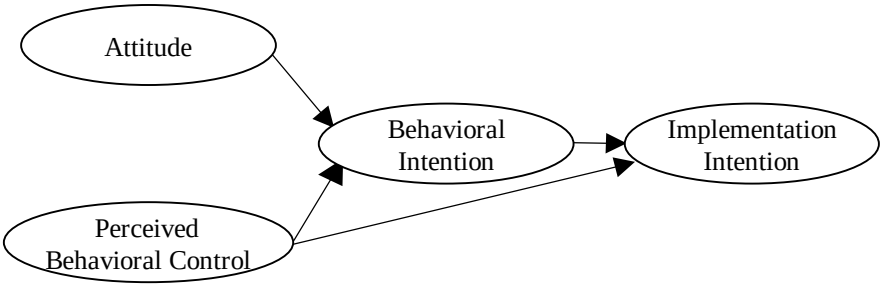

Figure 1. The hypothesized determinants of implementation intention.

The method of data collection employed in the present study differs from previous research. Instead of requesting participants to rate their attitude towards some future behavior, perceived behavioral control over the behavior, and behavioral intentions to perform the behavior, they were presented descriptions of two situations and asked to imagine that they already had formed a behavioral intention. By systematically varying the descriptions with respect to the benefit of the behavior and actual behavioral control, it was expected that conventional measures of attitude toward the behavior and perceived behavioral control would vary in predictable ways. Furthermore, consistent with the TPB (Ajzen, 1985, 1991), it was assumed that these measures would be causally related to a conventional measure of behavioral intention. How to measure implementation intention is less obvious since no such method has yet been devised. According to Gollwitzer's (1993, 1996) definition of implementation intention, its strength should be directly related to the degree to which the behavior is planned. However, while Gollwitzer primarily assumes that planning consists of making commitments to time and place, in the present study we conceptualize the formation of an implementation intention more broadly to imply *uncertainty reduction*. Acts entailed by the formation of an implementation intention or planning would then include information acquisition aimed at reducing uncertainty about the implementation, including decisions about time and place. Thus, we devised several rating scales tapping intentions to perform different planning acts. We term this a measure of *planning intention*. As part of the SEM exercise, measurement models are fitted for each of the measured latent variables or theoretical constructs attitude, perceived behavioral control, behavioral intention, and planning intention.

Method

Participants

A sample of 192 psychology undergraduates at Göteborg University (127 or 66.1% female and 65 or 33.9% male) was recruited to the study. They were on average 28.4 years old (SD = 6.2, range 20-47). Each of them received a gift voucher worth the equivalent of USD 5 in return for participating.

Procedure

Immediately after classes participants were asked to fill out a booklet. A minority of them did that while remaining in the classroom, whereas most participants filled out the booklet later at their own discretion and mailed it back. After having completed the booklet which took approximately 45 minutes, either in person or by mail participants received the gift voucher and written debriefing information.

The booklet[2] consisted of a front page with general instructions informing participants that they would be presented with descriptions of a number of mundane situations which frequently occur in everyday life. They were further asked to imagine themselves as being the actor in these situations, and to respond to them as if they were real. On separate pages following the front page, four different descriptions of two situations were presented in a counterbalanced order. Participants were requested to read each description in the order it appeared and then check the rating scales appearing below.

In each of the two situations, referred to as *Parents´ Dinner Party* and *Concert* respectively, participants were told that they had made a decision to perform a behavior. For each situation they received four versions in which large and small benenfit of Dinner Party, having dinner with the parents had a large benefit since the participants "… (were) low on food money … (and had) not met with (their) parents for a long time," in another version the behavior had a small benefit since the participants "… would rather be alone." At the same time the actual behavioral control performing the behavior was crossed with high and low actual behavioral control (see Appendix A)[3]. In one version of Parents´ was either high (the participant knew how to travel by bus to the parents´ house to be on time) or low (because of maintenance work leading to rerouting of the bus, the participant was uncertain about how long time the bus would take). In the descriptions of Concert a large benefit was induced as "It is a band that you really like and you look forward to the show," and a small benefit as "It isn´t actually your favorite band, but you believe that it can be a good time anyway." High and low actual behavioral control was varied as "You don´t believe that the show will be sold out" and "You don´t know if the show will be sold out."

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[2]Questions were also asked with the purpose of measuring a procrastination trait (Ferrari, Johnson, & McCown, 1995). These questions which are not reported here appeared first in half of the booklets, last in the remaining half. No order effect was observed.

[3]Half of the participants received a slightly different wording of each description with the aim of emphasizing that the goal was to avoid something undesirable (e.g., remaining hungry, foregoing the concert) rather than obtaining something desired (enjoying the meal, enjoying the concert). The results did not differ for the different wordings.

Following each description on the same page in the booklet, subjects performed ratings on a number of numerical seven-point scales with appropriate end-point definitions. The following six scales were supposed to measure attitude toward the behavior (A1-6): "degree of fun in doing X," "degree of positive/negative feelings from doing X," "degree of looking forward to do X," "degree of importance of doing X," "degree of requirement to do X," and "degree of need of doing X:" Another three scales aimed at measuring perceived behavioral control (PBC1-3), two of which have been commonly used in previous research (e.g., Sparks, Guthrie, & Shepherd, 1996). One of these scales was directly phrased ("degree of control over doing X"), another was indirectly phrased focusing on the difficulty of performing the behavior ("degree of difficulty in doing X"). An additional scale assessed perceptions of external obstacles ("degree to which something prevents you from doing X"). Three scales were used to measure behavioral intention (BI1-3): "strength of intention to reverse the decision to do X," "committment to implement the decision to do X," and "likelihood of implementing the decision to do X." A final six scales were included to measure planning intentions (PI1-6). They were selected to cover both planning the target behavior and making sure that the situation facilitated performance of the behavior. The scales included "the degree to which you will find out about things necessary to know for doing X," "the degree to which you will take measures to guarantee doing X," "the amount of preparations you will undertake for doing X," "the degree to which you will make sure that sufficient time is allocated for doing X," "the degree to which you make sure nothing conflicts in time with doing X," and "the degree to which you think through how to remove obstacles to do X."

Results

In the following analyses only one description was randomly selected for each participant[4] with the restriction that an equal number be retained of the eight descriptions of each situation. Thus, there were 24 descriptions in each cell of the 2 (large vs. small benefit) by 2 (high vs. low actual behavioral control) by 2 (situation: Parents´ Dinner Party vs. Concert) design matrix. Although Parents´ Dinner Party and Concert were originally considered to be replicates, they are in

[4]Additional analyses including all data were performed. However, these analyses requiring the estimation of a large number of variance-covariance matrices were computationally intractable. When conventional repeated-measurement assumptions were made to make computations feasible, the results did not differ importantly from those reported.

~~In these analyses conventional repeated-measurement assumptions were made.~~ ~~***{[if the reason for this model with repeated mesurement is not used is necessary, I write one possible reason as following]***~~**The analysis required quite much conputational time because sixteen 8×8 covarience matrixes of error terms for sixteen observed variables should be estimated additionaly in order to get rid of the biases resulted from 8 times repeated mesurement. It is quite difficult to search the best structure extensively and exaustexhaustivelyly in such a methodology. But)** ~~The~~ the ~~results were not different with respect to the main conclusions.~~

the following treated separately since preliminary analyses indicated that the results for them may differ.

As indicated in Table 1, the aggregated measures of attitude, behavioral intention, and planning intention have satisfactory Cronbach´s *a*s. However, *a* is somewhat low for the aggregated measure of perceived behavioral control. Table 2 gives the means of the aggregated measures related to the manipulations of benefit and actual behavioral control in the two different situations. Table 3 reports the results of 2 (high vs. low benefit) by 2 (high vs. low actual behavioral control) by 2 (situation: Parents´ Dinner Party vs. Concert) factorial analyses of variance (ANOVAs) on each measure. As may be seen, the results substantiate the success of the manipulations of benefit and actual behavioral control. Furthermore, behavioral intention increased with both benefit and actual behavioral control whereas planning intention increased with benefit and decreased with actual behavioral control. It may also be noted that the manipulation of benefit was unsuccessful for Parents´ Dinner Party, perhaps because many participants did not feel that meeting the parents for dinner would be attractive. On average participants also believed that the actual behavioral control was higher in that situation than in the other.

Table 1

Product-moment Correlation Coefficients, Means, Standard Deviations (SDs), Skewness, Kurtosis, and Cronbach´s a for each Measure. (The Skewness and Kurtosis Measures are Standardized. Squared Multiple Correlations are Given in the Diagonal.)

Measure	A	PBC	BI	PI
Attitude (A)	.75			
Perceived behavioral control (PBC)	.31	.57		
Behavioral intention (BI)	.74	.54	.84	
Planning intention (PI)	.60	.13	.62	.68
Mean	4.7	4.1	5.0	4.7
SD	1.3	1.1	1.2	1.3
Skewness	-1.5	-1.1	-2.9	-2.1
Kurtosis	-1.9	-1.9	-1.0	-0.7
Cronbach´s α	.91	.67	.81	.89

Univariate analyses do not allow inferences of the hypothesized causal relationships between the different latent variables. Therefore, SEM was used to test the goodness of fit of the hypothesized causal model (Figure 2). This approach included fitting measurement models for each of the latent variables. In the structural equation model the four latent variables are attitude toward the behavior (A), perceived behavioral control (PBC), behavioral intention (BI), and planning intention (PI) which are assumed to be related to the rating scales through the measurement models. In the structural model the latent variables are casually related to each other as well as to the exogenous, dummy coded design variables benefit (B), actual behavioral control (ABC), situation (S), and all their interactions. The covariances between the manifest variables were input to the SEM using maximum-likelihood estimates available in LISREL8 (Jöreskog & Sörbom, 1993). Descriptives are given in Table 4, whereas the equations which were fitted are shown in Appendix B.

Table 2
Means for the Different Measures Related to Manipulations of Benefit and Actual Behavioral Control in Descriptions of Two Situations.

	Actual behavioral control			
	Low		High	
	Small benefit	Large benefit	Small benefit	Large benefit
	Parents´ Dinner Party			
Attitude	4.6	4.8	5.0	4.3
Perceived behavioral control	4.1	4.2	4.9	4.7
Behavioral intention	4.7	4.9	5.3	4.8
Planning intention	4.7	4.9	4.5	4.1
	Concert			
Attitude	3.9	5.8	3.8	5.6
Perceived behavioral control	3.3	3.9	4.0	4.1
Behavioral intention	4.4	5.6	4.4	5.5
Planning intention	4.5	5.6	4.0	5.4

The estimation procedure entailed simultaneously fitting the measurement models, the posited causal relations from the exogenous variables to attitude

and perceived behavioral control, the causal relations from attitude and perceived behavioral control to behavioral intention hypothesized in the TPB, and in accordance with our hypotheses, the causal relations from perceived behavioral control and behavioral intention to planning intention. Since this model specification resulted in a somewhat unsatisfactory fit, other alternatives were considered. The best fit was obtained also positing a causal relation from attitude to perceived behavioral control. Although $\chi^2[df = 269] = 446.02$, $p<.05$ was still significant due to the large number of dfs, the other fit indexes were satisfactory: RMSEA = 0.059, NNFI = 0.921, and CFI = 0.930. As may be seen in Table 5, the parameter estimates corresponding to the expected relationships were all significant and had the expected signs.

Table 3

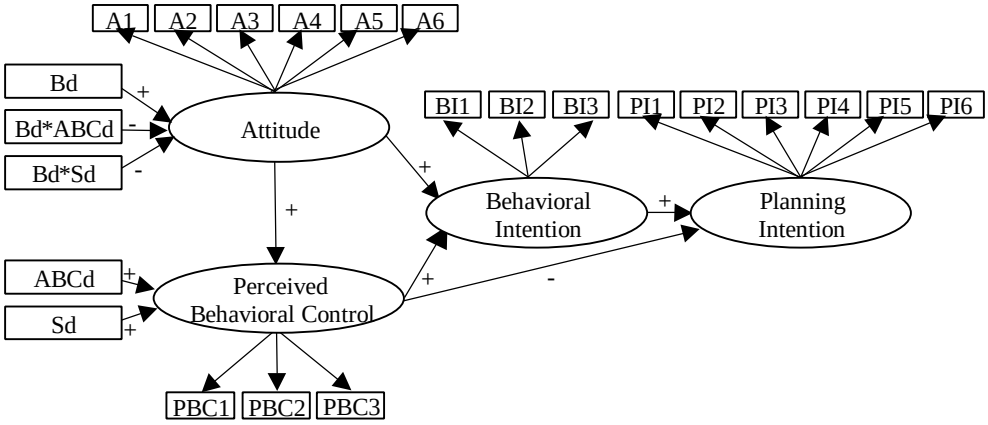

Figure 2. Estimated structural equation model.

Table 4

Table 5

Parameter Estimates from Structural Equation Modeling.

Measurement models				
Observed variables	Coeff.	t	Variance of error term	t
Attitude (A)				
A1	0.89	17.45	1.00	8.64
A2	1.00	-	0.69	7.78
A3	1.28	14.04	0.40	4.48
A4	1.05	10.02	1.49	8.79
A5	1.24	16.06	0.81	5.91
A6	0.94	8.76	1.93	9.36
Perceived behavioral control (PBC)				
PBC1	1.00	-	0.94	4.79
PBC2	-0.68	-5.89	1.47	8.87
PBC3	-0.99	-7.45	0.93	4.82
Behavioral intention (BI)				
BI1	-1.24	-12.86	0.64	7.50
BI2	1.00	9.95	1.11	8.94
BI3	1.00	-	0.54	8.05
Planning intention (PI)				
PI1	1.02	14.76	1.05	8.57
PI2	1.00	-	0.52	7.34
PI3	1.06	18.37	0.46	6.40
PI4	0.63	7.59	2.14	9.67
PI5	0.65	8.22	1.83	9.35
PI6	0.93	16.25	0.63	8.10

Pairs of observed variables	Covariance of error terms	t
A1 - A2	0.56	6.32
A3 - A5	-0.19	-3.15
A4 - A3	0.17	2.06
A5 - A2	0.28	3.05
A5 - A1	0.51	4.86
A6 - A4	0.80	5.74
PBC3 - PBC1	0.37	2.43
PI1 - PI4	0.46	4.09
PI5 - PI3	-0.27	-3.38
PI5 - PI4	0.71	4.76

Structural model								
	A		PBC		BI		PI	
	Coef.	t	Coeff.	t	Coeff.	t	Coeff.	t
Attitude (A)			0.43	5.50	0.63	9.30		
Perceived Behavioral Control (PBC)					0.29	4.47	-0.58	-4.10
Behavioral Intention (BI)							1.45	9.15
Planning Intention (PI)								
Bd	0.39	5.18						
ABCd			0.30	4.00				
Sd			0.43	5.47				
Ad*ABCd	-0.16	-2.22						
Ad*Sd	-0.44	-5.86						
Variance of error term	0.89	6.39	0.76	3.99	0.16	3.93	0.63	5.26

Discussion

The present study employed a procedure for data collection, featuring ratings of descriptions of fictitious although realistic situations, which differs from the procedures used in previous research investigating the theory of planned behavior or TPB (Ajzen, 1985, 1991). The results nevertheless confirmed the theory in showing that behavioral intention is causally related to attitude and perceived behavioral control. In addition the results showed that intention to plan or forming an implementation intention is causally related to behavioral intention. The results thus suggest how the TPB is related to the theory proposed by Gollwitzer (1993, 1996) in which goal intention and implementation intention are key constructs: Goal intention is probably related to behavioral intention whereas implementation intention does not seem to have any counterpart in the TPB. This is consistent with the observation that the TPB does not specify how intentions are implemented in behavior which is the primary focus of Gollwitzer´s theory.

Another noteworthy finding of the present study is that perceived behavioral control appeared to be causally related to attitude. This was observed despite that benefit of the behavior was crossed with actual control over the behavior in the descriptions of the fictitious situations, thus it may reflect a bias or illusion. Consistent with this finding some previous research has demonstrated an outcome-desirability bias (Budescue & Bruderman, 1995; Gärling et al., 1999; Zakay, 1985), that is, that desirability of an outcome causes people to perceive the outcome to be more likely. Specifying such a causal relation between attitude and perceived behavioral control may in fact improve the fit of models aiming at testing the influence of perceived behavioral control over and above attitude. An implication in the present study is that people are somewhat less likely to form implementation intentions than they would otherwise be. The well-known over-confidence phenomenon demonstrated for confidence judgments (Kahneman et al., 1982), that is, that confidence is perceived to be higher than it is, works in the same direction. Both the outcome-desirability bias and over-confidence therefore help to explain why inducing an implementation intention has been so successful in increasing the intention-behavior consistency in previous research (Gillholm et al., 1999a, 1999b; Gollwitzer & Brandstätter, 1997: Orbell et al., 1997; Sheeran & Orbell, 1999). It certainly appears to be a weak manipulation to ask people to indicate where and when they intend to perform a particular target behavior. Yet, strong effects of this manipulation are obtained. Perhaps this is because in everyday life over-confidence and desirability-outcome biases prevent people from investing the marginal additional effort that will assure that a behavior is performed.

However, motivation is another important factor demonstrated in the present study to affect planning intentions. Thus, a low motivation (which in part may be the result of low perceived control) also defeat the formation of an implementation intention. This may indeed explain why there is a relationship between intention *strength* and the likelihood that a target behavior is performed (Sheppard et al., 1988). It may be noted that our finding that motivation increases planning intention in no way is in conflict with the fact that Gillholm et

al. (1999a, 1999b) and Sheeren and Orbell (1999) showed that inducing an implementation intention does not increase the motivation to perform the behavior. Yet, it is possible that the effect of inducing an implementation intention depends on that participants are not sufficiently motivated to perform the target behavior (e.g., taking vitamin pill C every day). In this case participants who are not induced to form an implementation intention are less likely to do that spontaneously. If they are, the difference between an experimental group in which an implementation intention is induced and a control group in which it is not induced would be washed out.

It should finally be pointed out that, as far as the present results go, they are consistent with several demonstrations of how the formation of implementation intention increases the likelihood that a particular behavior is performed (Gillholm et al., 1999a, 1999b; Gollwitzer & Brandstätter, 1997: Orbell et al., 1997; Sheeran & Orbell, 1999). Even though no observations were made of actual performance of a behavior, the intentions stated by participants that they would engage in planning should be a valid predictor of the behavior, at least in situations where actual control is possible to achieve. In fact, this points to another complementary measure to include when the research task is limited to predicting behavior.

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Appendix A

Parents´ Dinner Party

Large benefit/high actual behavioral control

Your mother calls and asks if you would like to have dinner with her and your father at 7 pm the following evening. Since you are low on food money you say yes. Furthermore, you haven´t met with your parents in a while. Your mother says that you should be on time so that the food does not become cold. Your parents live about 12 miles from your house and you usually take the bus there. You believe that there is a bus going there every 15 minutes. The trip usually takes 30 minutes. You do not have access to a time table.

Large benefit/low behavioral control

Your mother calls and asks if you would like to have dinner with she and your father at 7 pm the following evening. Since you are low on food money you say yes. Furthermore, you haven´t met with your parents in a while. Your mother says that you should be on time so that the food does not become cold. Your parents live about 12 miles from your house and you usually take the bus there. You believe that there is a bus going there every 15 minutes. The trip usually takes 30 minutes. *One problem is that there is roadwork underway along the route that the bus follows. Your mother has said that the usual bus may therefore not come all the way to their house, and you may eventually need to change to another bus.* You do not have access to a time table.

Small benefit/high behavioral control

Your mother calls and asks if you would like to have dinner with she and your father at 7 pm the following evening. *You would rather be alone, but you say yes anyway.* Your mother says that you should be on time so that the food does not become cold. Your parents live about 12 miles from your house and you usually take the bus there. You believe that there is a bus going there every 15 minutes. The trip usually takes 30 minutes. You do not have access to a time table.

Small benefit/low behavioral control

Your mother calls and asks if you would like to have dinner with her and your father at 7 pm the following evening. *You would rather be alone, but you say yes anyway.* Your mother says that you should be on time so that the food does not become cold. Your parents live about 12 miles from your house and you usually take the bus there. You believe that there is a bus going there every 15 minutes. The trip usually takes 30 minutes. *One problem is that there is roadwork underway along the route that the bus follows. Your mother has said that the usual bus may therefore not come all the way to their home, and you may eventually need to change to another bus.* You do not have access to a time table.

Concert

Large benefit/high behavioral control

This evening you've decided that together with some friends you'll go and see a band that plays in town at 9 o'clock. It is a band that you really like and you look forward to the show. There aren't any tickets to buy in advance. You don't believe that the show will be sold out.

Large benefit/low behavioral control
This evening you've decided that together with some friends you'll go and see a band that plays in town at 9 o'clock. It is a band that you really like and you look forward to the show. There aren't any tickets to buy in advance. *You don't know if the show will be sold out.*
Small benefit/high behavioral control
This evening you've decided that together with some friends you'll go and see a band that plays in town at 9 o'clock. *It isn't actually your favorite band, but you believe that it can be a good time anyway.* There aren't any tickets to buy in advance. You don't believe that the show will be sold out.
Small benefit/low behavioral control
This evening you've decided that together with some friends you'll go and see a band that plays in town at 9 o'clock. *It isn't actually your favorite band, but you believe that it can be a good time anyway.* There aren't any tickets to buy in advance. *You don't know if the show will be sold out.*

Appendix B

Measurement model equations

$$\mathbf{Y} = \begin{pmatrix} \text{Attitude} \\ \text{Perceived Behavioral Control} \\ \text{Behavioral Intension} \\ \text{Planning Intention} \end{pmatrix} f \oplus f \dot{\imath}$$

Structural model equations

$$\begin{pmatrix} \text{Attitude} \\ \text{Perceived Behavioral Control} \\ \text{Behavioral Intension} \\ \text{Planning Intention} \end{pmatrix} = \begin{pmatrix} \text{Attitude} \\ \text{Perceived Behavioral Control} \\ \text{Behavioral Intension} \\ \text{Planning Intention} \end{pmatrix} \mathbf{B} + f \text{¡} \mathbf{X} + \begin{pmatrix} x_A \\ x_{PBC} \\ x_{BI} \\ x_{PI} \end{pmatrix}$$

where,

X = (Bd, ABCd, Sd, Bd × ABCd, Bd × Sd, ABCd × Sd, Bd ×ABCd × Sd)'

Y = (A1, A2, A3, A4, A5, A6, PBC1, PBC2, PBC3, BI1, BI2, BI3, PI1, PI2, PI3, PI4, PI5, PI6)'

x_A, x_{PBC}, x_{BI}, x_{PI}: error terms of latent variables,

G, L, **B**: parameter matrix

e: vector of error term for **Y**