

# Unit (Non)Response in Web-Based Access Panel Surveys: An Extended Planned-Behavior Approach

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## ABSTRACT

The decision process when requested to participate in a Web survey is understood most appropriately by applying a psychological theory of human action. Consequently, this study utilized an extended version of Ajzen's theory of planned behavior to predict and explain the number of participations in a five-wave Web-based panel study. Based on this model, the determinants of unit nonresponse in Web-based surveys are one's attitude toward participating in Web surveys, internalized social pressure, perceived behavioral control, and extent of moral obligation toward participating. The results indicate a satisfactory predictive power of the model. Perceived behavioral control and attitude toward participation predict the intention to participate best, followed by internalized social pressure and moral obligation. The theoretical perspective pursued proved to be valuable in terms of its predictive and explanative power as well as its practical value for Web-based survey research. © 2005 Wiley Periodicals, Inc.

Survey methodologists number among the least theoretically oriented of social scientists, and the lack of concerted thought about the meaning of response and nonresponse has often been noted (Goyder, 1987, p. 11).

Although surveys on the World Wide Web (Web-based surveys) offer a variety of opportunities for the visualization of judgmental objects by incorporating animations and films, permitting the inclusion of technically advanced interfaces for data input, and enabling the response process to be traced automatically (Bosnjak & Tuten, 2001), they are also characterized by the fact that data may be missing for some units of a sample, either partially or for all variables. This problem of missing data is generally known as nonresponse, whereby one usually differentiates between unit and item nonresponse (Groves & Couper, 1998). Unit nonresponse refers to the complete loss of a survey unit, and item nonresponse refers to missing responses to individual questions. Nonresponse is of particular importance to researchers because the unknown characteristics and attitudes of nonrespondents may cause inaccuracies in the results of the study in question (nonresponse bias). Nonresponse bias itself is a function of the real differences between respondents and nonrespondents on the variables of interest and the final response rate obtained (e.g., Rogelberg & Luong, 1998). Considering that response rates are consistently lower for Web surveys when compared to other self-administered survey modes (Schonlau, Fricker, & Elliott, 2002; Tuten, Urban, & Bosnjak, 2002), nonresponse bias represents an even more threatening factor for the validity of results obtained via Web surveys.

The rubric *Web-based survey* encompasses a wide variety of methods, with different purposes, populations, target audiences, and sample recruiting approaches (see, e.g., Couper, 2000, for a comprehensive overview). Especially in marketing research, prerecruited Web-based access panels, broadly defined as pools of subjects who expressed their willingness to participate in Web surveys on a regular basis (Görizt, Reinhold, & Batinic, 2002) are most widely used. Once such a panel is built, how can one predict and explain why people do or do not comply with requests to take part in Web surveys? How can one identify the psychological constructs and mechanisms involved?

The literature on (non)response and (non)compliance with requests to participate in self-administered surveys has attempted to answer these questions by considering the following three lines of research: (a) research on survey design factors influencing response rates (e.g., Claycomb, Porter, & Martin, 2000; Kanuk & Berenson, 1975; Yammarino, Skinner, & Childers, 1991; Yu & Cooper, 1983), (b) research on respondent factors associated with (non)response (Heberlein & Baumgartner, 1978; Lubin, Levitt, & Zukerman, 1962; Rogelberg, Conway et al., 2003), and (c) integrative models describing the psychological processes leading to survey (non)participation (e.g., Albaum, Evangelista, & Medina, 1998; Helgeson, Voss, & Terpening, 2002).

The first line of research, survey design factors influencing response rates, resulted in the largest number of publications by far. Based on research syntheses conducted on this vast amount of literature, only a few survey design factors have a consistent and significant effect on observed response rates. For mail surveys, the most effective factors include personalization of requests to participate (Dillman, 1978, 2000; Fox, Crask, & Kim, 1988; Heberlein & Baumgartner, 1978; Yammarino et al., 1991; Yu & Cooper, 1983), prepaid monetary incentives (Church, 1993; James & Bolstein, 1992), and the number of contacts made (Armstrong & Lusk, 1987; Fox et al., 1988; Heberlein & Baumgartner, 1978; Yammarino et al., 1991; Yu & Cooper, 1983). For Internet-based surveys, Sheehan (2001) synthesized the results of 31 e-mail surveys and found that only the year the survey was undertaken (decreased response rates for more recent surveys) and the number of follow-up contacts were able to predict response rates. Other variables included, such as the number of questions and prenotifications, did not predict response rates in surveys conducted via e-mail. Cook, Heath, and Thompson (2000) found by means of a meta-analysis that the number of contacts, personalized contacts, and precontacts are the factors most associated with higher response rates in Web studies. Overall, studies aimed at increasing response rates to self-administered surveys indicate an essentially data-driven and rather behavioristic program of research aimed at finding the most predictive factors to improve response rates. Accordingly, they seem to be rather limited in helping to theoretically understand the antecedent psychological processes resulting in (non)compliance to survey requests. They do not specify the psychological constructs and mechanisms involved in a decision against participation.

The second line of research is aimed at identifying respondent factors associated with (non)response. For instance, respondents may be better educated or of a higher socioeconomic status than nonrespondents (Clausen & Ford, 1947; Vincent, 1964; Wallace, 1954). Personality differences may exist (Lubin et al., 1962), but personality traits like conscientiousness seem to have a rather small predictive power (Rogelberg, Conway et al., 2003). Another common difference identified is the level of interest in the survey topic, especially the salience of the topic (Heberlein & Baumgartner, 1978). Respondents are presumed to have more interest in the topic than nonrespondents in mail surveys (Armstrong & Overton, 1977; Baur, 1947; Mayer & Pratt, 1966; Suchman & McCandless, 1940) as well as in Internet-based surveys. Bickart and Schmittlein (1999, p. 287) illustrated that some respondents display a survey-response propensity (an enduring personal characteristic), and nonrespondents may either lack this survey-response propensity or may be suffering from survey-response fatigue. Another conceptually related area that holds promise for explaining (non)response behavior is that of attitudes toward participation. Schleifer (1986) revealed a downward trend in public opinion regarding the value of participating in survey research and a syn-

chronous decrease in response rates. Sharp and Frankel (1983) observed that survey refusal decisions are based to a large degree on attitudinal constructs. Rogelberg, Fisher, Maynard, Hakel, and Horvath (2001) found that attitudes toward participating in organizational surveys are significantly associated with item nonresponse. Groves, Singer, and Corning (2000) demonstrated the role of social norms when individuals decide to participate in surveys. In essence, people serving for civic duties tend to be overrepresented. Similarly, Bosnjak and Batinic (2002) showed that the extent to which an individual feels morally obliged to participate in Internet-based surveys plays an important role in predicting the willingness to participate. Taken together, this evidence suggests that attitude toward research as well as socially shaped norms are important determinants of respondent behavior.

The third line of research is that of integrative conceptual models to predict and explain (non)participation in self-administered surveys. One of the most prominent integrative frameworks is social exchange theory (Blau, 1964; Thibaut & Kelley, 1959). Dillman (2000) describes the fundamental idea of this approach as follows:

Actions are motivated by the return these actions are expected to bring and in fact, usually do bring, from others. The likelihood of responding to the request to complete a self-administered questionnaire, and doing so accurately, is greater when the respondent trusts that the expected rewards of responding will outweigh the anticipated costs. (Dillman, 2000, p. 27)

Based on this social-exchange principle, Dillman's tailored design method encompasses methods and procedures for implementing self-administered surveys to increase response rates, by specifying the number of contacts needed, the messages to be conveyed, and the procedure to deliver incentives (Dillman, 2000). From a theoretical point of view, the tailored design method is best described as a prescriptive theory of survey participation aimed at increasing response rates. Social exchange theory is used as the theoretical umbrella to integrate the recommendations, but social exchange theory itself is not challenged. That is why Dillman himself admitted that the tailored design method ". . . is based partly on research findings. It is also based on theoretical arguments that are difficult to evaluate experimentally, and as a result have not yet been well tested" (Dillman, 2000, p. 15).

Another prescriptive framework sometimes misunderstood as a descriptive theory of survey participation is based on Cialdini's persuasion principles and was proposed by Groves, Cialdini, and Couper (1992). In essence, this approach integrates social exchange, cognitive dissonance, and self-perception theory (see, e.g., Albaum et al., 1998, for an overview) by laying out seven compliance principles: reciprocation, consistency, social validation, authority, scarcity, liking, and mechanisms facilitating altruistic behavior (Groves, Cialdini, & Couper, 1992). Although the effectiveness of these persuasion principles is well understood in domains

like advertising psychology and consumer behavior (e.g., Jacoby, Johar, & Morrin, 1998), it is not in the case of self-administered surveys, in general, nor for the specific domain of Web surveys. Furthermore, the prescriptive nature of these principles may help in reducing nonresponse rates, but seem less promising in identifying the theoretical constructs and mechanisms resulting in (non)respondent behavior.

Helgeson, Voss, and Terpening (2002) applied a hierarchy-of-effects model (Lavidge & Steiner, 1961) to understand how both survey design and respondent factors affect specific stages of the response process and enhance participation in mail surveys. The model suggests that survey-response behavior is a process that moves from attention to behavior in the following sequence: Attention → Intention → Completion → Return. Helgeson et al. (2002) found that the attitudes toward research affected the attention, intention, and return stages. Incentives influenced all three stages of the proposed model. From a theoretical perspective, attitudes toward research seemed to be the only psychological construct involved; other potential factors known from the literature cited above, like socially shaped norms, were not considered.

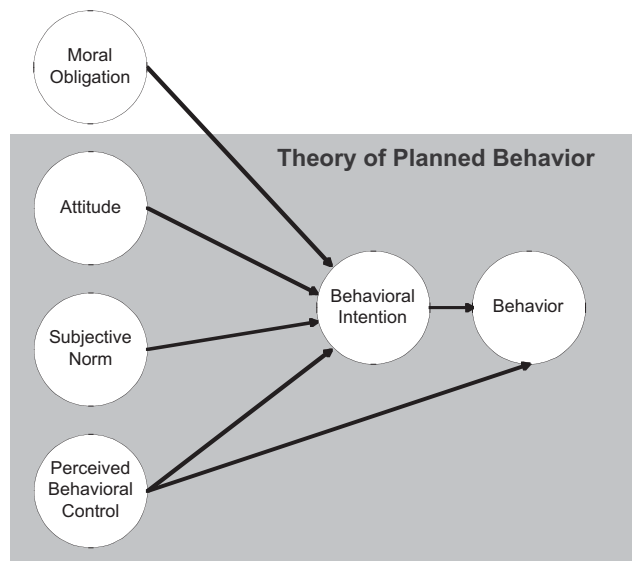
One approach that holds promise for specifying the psychological constructs and processes leading to a decision for or against participation in self-administered surveys was proposed by Hox, de Leeuw, and Vorst (1995, 1996) and Lockhart (1986). These authors used the theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) to predict and explain participation in mail surveys. Compatible with the literature on factors affecting response behavior in mail surveys, this model encompasses attitudes toward a behavior and the subjective norm involved, mediated by intention, to influence the behavior in question. Ajzen (1985, 1991) extended this model by adding an additional component called “perceived behavioral control” to make the theory applicable to behaviors that are not under full volitional control, that is, behaviors that are restricted by, for example, time, financial resources, skills, and knowledge. This extended model, called the theory of planned behavior, is most promising for application to the content area of predicting and explaining unit (non)response in Web surveys. Before turning to the specific research questions and hypothesis pursued, the theoretical framework for the study will be outlined.

## **THEORETICAL BASE: AN EXTENDED THEORY OF PLANNED BEHAVIOR**

According to the theory of planned behavior (Ajzen, 1985, 1991), a central determinant of behavior is the individual’s intention to perform the behavior in question. Intentions capture the goal-oriented nature of human behavior. They indicate decisions, or plans of action. As people formulate their intentions, they are assumed to take into account three conceptually

independent types of considerations. First, they form beliefs about the likely consequences of a contemplated course of action, which result in a favorable or unfavorable attitude toward performing the behavior. A second type of consideration has to do with the assumed normative expectations of relevant referent groups or individuals. These normative beliefs lead to the formation of a subjective norm—the perceived social pressure to perform or not perform the behavior. Finally, people are assumed to take into account factors that may further or hinder their ability to perform the behavior. These control beliefs lead to the formation of perceived behavioral control, which refers to the perceived ease or difficulty of performing the behavior. As a general rule, the more favorable the attitude and subjective norm with respect to a behavior, and the greater the perceived behavioral control, the stronger an individual’s intention to perform the behavior under consideration will be. Figure 1 depicts the theory’s main components in the form of a structural diagram. Figure 1 clearly demonstrates that the perceived behavioral control construct influences behavior indirectly (via intention), as well as directly.

The model has been extended in this study by adding the construct *moral obligation*. Gorsuch and Ortenberg (1983) suggested that a moral-obligation component be added to the theory of reasoned action, and Conner and Armitage (1998) made a similar suggestion with regard to the theory of planned behavior. Porst and von Briel (1995) found that when people are asked for their reasons for participating in surveys, the “moral obligation” of supporting research is given. According to Bosnjak and Batinic (2002), the extent to which an individual feels morally obliged to participate in Internet-based surveys plays an important role in predicting the willingness to participate. This study, therefore, adds the construct of moral obligation to the basic planned behavior model (see Fig-



**Figure 1.** An extended planned-behavior model to predict and explain unit (non)response in Web-based surveys.

ure 1). Although subjective norm reflects the perceived social pressure as a subjectively represented external force, moral obligations reflect *internalized moral rules*, not perceptions of others' ideas about what one should do. As several authors suggested for other behavioral domains (e.g., Gorsuch & Ortenberg, 1983; Pomazal & Jaccard, 1976; Zuckerman & Reis, 1978), moral obligation should exert an indirect effect on behavior, where behavioral intention serves as the mediator. Thus, moral obligation should increase the amount of explained variance in intention—the stronger the perceived moral obligation to participate, the stronger the intention to participate should be.

## RESEARCH QUESTIONS AND HYPOTHESES

The basic research question is aimed at evaluating the usefulness of the planned-behavior model to understand (non)participation in Web-based surveys. The term *usefulness* is defined here as the predictive validity of the model, at both the intentional and behavioral levels. To meet the needs for a satisfactory predictive power, a medium effect size ( $f^2 = R^2 / 1 - R^2$ ), as defined by Cohen (1988, 1992) is expected.

**H1:** The planned-behavior model should predict (a) the intention to participate as well as (b) the actual participation in a series of Web surveys with an at least medium effect size.

H1 specifies the minimum predictive power expected for the planned-behavior model as proposed by Ajzen (1985, 1991). For the case of participation in Web-based surveys, moral obligation is expected to contribute to the prediction of behavior over and above attitudes, subjective norm, and perceived behavioral control, illustrating incremental validity for the content area under investigation:

**H2:** Moral obligation contributes significantly to the prediction of intention over and above the model components specified in the planned-behavior model.

H1 assumes a minimum overall predictive power of the planned-behavior model for the content area of participation in Web-based surveys. H2 states that moral obligation adds its unique contribution in the prediction of intention. Neither hypothesis specifies the direction nor the relative contributions of the respective predictors. Given the rather scattered body of knowledge on these predictors, only the direction of influence is specified:

**H3:** (a) Attitudes, (b) subjective norm, (c) perceived behavioral control, and (d) moral obligation are positively related to the intention to participate in Web surveys.

**H4:** (a) Intention and (b) perceived behavioral control are positively related to the actual participation in Web surveys.

Taken together, the planned-behavior model is expected to predict the willingness to participate as well as the actual participation in a Web-based panel survey at least sufficiently (H1), the additional variable called *moral obligation* should be a useful addition to the model, to be reflected in its incremental contribution (H2), and all model components are positively related to intentions and behavior (H3 and H4).

## METHOD

### Subjects and Procedure

The study consisted of two parts. In the first part, paper-based questionnaires to assess all relevant predictors encompassing the components of the extended planned-behavior model, sociodemographics, and “Webographics,” and the individual’s e-mail address were administered to 400 undergraduate business students at three colleges in the mid-Atlantic United States. Filling out this questionnaire was part of a class assignment and therefore obligatory. Of the 400 students, 51% were female and 49% male. The majority were between the ages of 19 and 26 (88%), single (94%), and Caucasian (84%). The second part of the study aimed at observationally measuring behavior encompassed five waves. Invitations to participate in Web surveys on subtopics dealing with Internet-based marketing were sent out by e-mail every month for five months (five-wave access panel study).

### Measurement

Within the initially administered paper-based questionnaire, the target behavior (participating in the five-wave panel study on themes related to Internet-based marketing) was described. Then, items to assess all relevant predictors were arranged in fixed-random format. All items belonged to one of the extended planned behavior model’s constructs as described above and were constructed according to the recommendations given by Ajzen and Fishbein (1980, pp. 261ff) and Ajzen (2002).

Attitudes toward participating in the five-wave panel study were measured with the use of a six-item, 7-point semantic-differential scale. The items that were introduced by the text “My participation in the series of Web surveys related to Internet-based marketing is . . . were Good–Bad, Negative–Positive, Unpleasant–Pleasant, Interesting–Uninteresting, Unattractive–Attractive, Rewarding–Punishing.” The reliability for these attitude items, as measured by Cronbach’s alpha, was 0.87.



*Subjective norms* were measured by asking subjects to respond to three 7-point items reflecting the normative pressure to participate or not to participate in the whole series of Web surveys:

1. Most people who are important to me think . . . I should/I should not . . . participate in the series of Web surveys.
2. Most people whose recommendations I like to comply with think . . . I should/I should not . . . participate in the series of Web surveys.
3. Most people I would think of when requested to participate in the series of Web surveys would expect me . . . To participate/Not to participate.

Cronbach's alpha was 0.77 for this set of items.

*Perceived behavioral control* was assessed with the use of six 7-point items to refer to internal (perceived competence) and external (perceived obstacles) factors relevant to take part in the five-wave panel study:

1. How much control will you personally have to decide about your participation in all the studies within the series of Web surveys described above? (A great deal of control–Absolutely no control).
2. My freedom to decide independently about my participation in the series of studies described above is . . . Extreme–Very limited.
3. I assume that I will have all the resources available necessary to participate in the series of Web surveys described above (Definitely true–Definitely not true).
4. I feel capable of providing answers to questions concerning the topics in the series of surveys (Internet-based marketing) described above (Definitely true–Definitely not true).
5. My participation in the series of studies described above is . . . Easy–Difficult.
6. I assume that I will not have the time to participate in the series of studies described above (Definitely true–Definitely not true).

Cronbach's alpha was 0.81.

The construct *moral obligation* was assessed by means of four 7-point items referring to the extent of the perceived internalized moral pressure to take part in the five-wave panel study:

1. My conscience calls me to participate in the series of surveys described above (Definitely true–Definitely not true).
2. My decision to participate or not in the series of studies described above is fully in line with my moral conviction (I strongly agree–I strongly disagree).

3. I feel morally obliged to participate in the series of surveys described above (Definitely true–Definitely not true).
4. If I could contribute to research with my participation in the series of studies described above, then I should participate (I strongly agree–I strongly disagree).

Cronbach's alpha for the items referring to the perceived moral obligation to participate was 0.69.

*Behavioral intentions* were measured with the use of six 7-point items assessing the individual's intention to take part in the series of Web surveys plus one composite item:

1. I intend to participate in each survey within the series of studies described above (Definitely true–Definitely not true).
2. I am willing to participate in the whole series of surveys described above (Definitely true–Definitely not true).
3. I will make an effort to participate in the whole series of surveys described above (Definitely true–Definitely not true).
4. I will try to participate in the whole series of surveys described above (Definitely true–Definitely not true).
5. My intention to participate in the whole series of surveys described above is . . . Very strong–Very low.
6. I am planning to participate in the whole series of surveys described above (Definitely true–Definitely not true).

The composite item used in addition to the six items mentioned above was constructed as follows: For every single Web survey within the five-wave panel study, subjects had to rate on a 7-point scale how likely it is that they will participate in the respective wave. The mean score over these five probability ratings served as the composite item. For all six items comprising the behavioral intention scale, Cronbach's alpha was 0.92.

For all five constructs mentioned above, the scale values were obtained by averaging responses for the respective item sets (mean score). The higher the attitude score, the more positively was the participation in the five-wave panel study evaluated. By the same token, the higher the mean score for subjective norm and moral obligation, the higher was the perceived external normative pressure (for subjective norm) and internal normative pressure (for moral obligation) to participate. Higher scores on the perceived behavior control scale indicate a positive attitude regarding the ease of participating in the whole series of surveys. Finally, higher scores on behavioral intention indicate a stronger willingness to comply with all five requests to participate.

Subjects who took part in the obligatory initial paper-based questionnaire were invited to take part in a series of Web surveys thematically related to Internet-based marketing, conducted once per month for five months. The particular Web surveys were on: online shopping behavior (first month), attitudes toward Web ads (second month), security of transactions via the Web (third month), image of on-line and off-line organizations (fourth month), and Web usage (fifth month). Participation in these Web surveys was voluntary; no incentives were offered. The number of participations in this five-wave panel study served as the behavioral criterion. Table 1 summarizes the scale value ranges, descriptive statistics, intercorrelations, and reliability coefficients for all the assessed components of the extended planned-behavior model. The overall frequency of participation was only moderate. On average, subjects who took part in the initial paper-based questionnaire participated only once within the five-wave panel study ( $SD = 1.6$ ). With regard to the bivariate correlations represented in Table 1, no single intercorrelation is conspicuously high enough to indicate redundancies, which could indicate a possible collinearity problem.

## RESULTS

### Prediction of Behavioral Intention

For the prediction of the intention to participate in the series of Web surveys, a large predictive effect can be demonstrated. The adjusted squared multiple correlation coefficient amounts to 0.69 ( $f^2 > 1$ ), encompassing the four predictors: (a) attitude toward participating, (b) the perceived normative pressure to participate (subjective norm), (c) the perceived behavioral control associated with participating, and (d) the extent of perceived moral obligation to take part in the Web-based five-wave panel study. Table 2 presents the results of hierarchical regression analyses for the prediction of intentions to participate in the series of Web surveys.

For the prediction of intentions to participate in the Web-based five-wave panel study on themes related to Internet-based marketing, attitude, subjective norm, and perceived behavioral control were entered on the first step (planned-behavior model as proposed by Ajzen, 1991), and moral obligation on the second step (extended planned-behavior model). As shown in Table 2, all predictors entered on the first step made significant contributions to the prediction of intention. Based on the standardized regression weights ( $\beta$ ), perceived behavioral control predicts intention best ( $\beta = .41$ ), followed by attitude toward participating ( $\beta = .34$ ), and then subjective norm ( $\beta = .25$ ). Consistent with the extended planned-behavior model as proposed in this article, moral obligation significantly improved the model's predictive power,  $F(1, 396) = 18.78, p <$

**Table 1. Scale Value Ranges, Means, Standard Deviations, Correlations, and Cronbach's Alpha Coefficients of All Model Components of the Extended Planned Behavior Model (N = 400).**

Scale{and range of possible values on the respective scale}	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. Behavior Frequency of participation {0 to 5}	1.04	1.60	<b>NA</b>					
2. Behavioral intention {1 to 7}	4.86	1.41	.41	<b>.92</b>				
3. Attitude {-3 to 3}	0.52	1.19	.32	.68	<b>.87</b>			
4. Subjective norm {-3 to 3}	0.81	1.19	.22	.64	.55	<b>.77</b>		
5. Perceived behavioral control {1 to 7}	5.34	1.00	.33	.70	.49	.51	<b>.81</b>	
6. Moral obligation {1 to 7}	4.31	1.25	.14	.60	.52	.64	.43	<b>.69</b>

*Note.* Coefficient alphas are presented in boldface along the diagonal. All coefficients are significant at  $p < .01$ . NA = Not applicable, because of a single item measure.

**Table 2. Hierarchical Regression Analyses Predicting the Intention to Participate in a Five-Wave Web-based Panel Study on Themes Related to Internet-Based Marketing (N = 400).**

Step	Variable	<i>r</i>	$\beta$	<i>R</i>	<i>R</i> <sup>2</sup>	<i>R</i> <sup>2</sup> <sub>adj</sub>	<i>R</i> <sup>2</sup> <sub>change</sub>
1. Planned-behavior model	Attitude	.68	.34				
	Subjective norm	.64	.25	.825	.680	.678	–
	Perceived behavioral control	.70	.41				
2. Extended planned-behavior model	Attitude	.68	.31				
	Subjective norm	.64	.17	.834	.695	.692	.014
	Perceived behavioral control	.70	.40				
	Moral obligation	.60	.16				

*Note.* All coefficients are significant at  $p < .01$ .

**Table 3. Multiple Regression Analysis Predicting the Number of Participations in a Five-Wave Web-Based Panel Study on Themes Related to Internet-Based Marketing as the Behavioral Criterion (N = 400).**

Variable	<i>r</i>	$\beta$	<i>R</i>	<i>R</i> <sup>2</sup>	<i>R</i> <sup>2</sup> <sub>adj</sub>
Intention	.41	.34	.41	.17	.16
Perceived behavioral control	.33	.09 *			

*Note.* \* Not significant; all other coefficients are significant at  $p < .01$ .

.01. The incremental linear share of variance added by moral obligation amounts to 1.4% ( $R^2_{\text{change}} = .014$ ). Its standardized regression coefficient ( $\beta = .16$ ) indicates that moral obligation is the least important variable to predict intention.

With regard to the present hypotheses, the observed predictive effect exceeded expectations (see H1). Furthermore, moral obligation proved to be a useful addition, because it contributed significantly to the prediction of intention over and above the model components specified in the planned-behavior model (H2). Finally, all relations to intention were positive, as specified in H3.

## Prediction of Behavior

Prediction of behavior was operationalized within this study as the number of participations in the five-wave panel study ( $M = 1.04$ ,  $SD = 1.60$ ) and a satisfactory predictive power of a medium effect size was observed. The adjusted squared multiple correlation coefficient amounts to .16 ( $f^2 = .19$ ), encompassing the two predictors of intentions and perceived behavioral control. Table 3 summarizes the results of the multiple regression analysis.

As shown in Table 3, behavioral intention predicted behavior best ( $\beta = .34$ ), whereas perceived behavioral control exerts no significant effect. With regard to the hypotheses, H4(a) was supported, and H4(b) was not supported in this study.

## CONCLUSIONS AND IMPLICATIONS

The results of this study indicate that the extended theory of planned behavior is a suitable framework for explaining the decision to participate or not in Web-based panel studies. Moral obligation, defined here as a variable reflecting internalized rules, seems to be a useful extension to the theory of planned behavior and for use as a predictor of response to Web-based surveys.

Further, the extended planned-behavior model provides a theory base for practical guidelines. For instance, why does the number of contacts increase response rates? Does it result in increases in attitude like the mere-exposure effect (Zajonc, 1968) or theories of cognitive processing fluency (Winkielman, Schwarz, Fazendeiro, & Reber, 2003) would predict? What psychological processes are responsible for the effect of incentives on survey participation? Does the use of incentives result in increases in moral obligation to respond in the sense that individuals all act upon internalized norms, forcing one to repay something that was not requested? What about persuasion strategies as summarized by Groves, Cialdini, and Couper (1992)? Why do they work in a (Web) survey context? With the extended planned-behavior model, these frequently used guidelines can be integrated.

Besides its integrative potential, the extended planned-behavior model also has immediate practical relevance. First, if assessed within the framework of an initial registration for a Web-based panel, its components could provide an indicator of a participant's anticipated compliance with requests to participate. This information could be valuable in determining if the initial sample size will be sufficient for the desired level of participation. It could also be used as a qualifying variable in accepting respondents for panels. Second, this study gives an initial hint of how one can influence the decision to participate. Because nonresponse seems to be primarily a matter of perceived behavioral control and attitude toward participating, these two constructs should be the target of persuasive measures. Finally, because the model proposed here can predict (non)response satisfactorily, it can be used for propensity score weighting techniques (Rosenbaum & Rubin, 1983, 1984) and help to improve the accuracy of survey results obtained by means of Web-based access panels.

As a next step, the underlying cognitive foundation of the model components might be assessed. These beliefs, which lead to the formation of attitudes, subjective norm, perceived behavioral control, and moral obligation, should give us a deeper understanding of the decision processes involved. By modeling all levels of the planned behavior theory, researchers may have a means of understanding the psychological antecedents of participation in Web surveys.

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