

The Interactive Effects of Motivations and Trust in Anonymity on Adolescents' Enduring Participation in Web-Based Social Science Research: A Longitudinal Behavioral Analysis

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Abstract: Based on self-determination and social exchange theory, this study investigates the effects of extrinsic motivation, intrinsic motivation, and trust in anonymity on enduring survey participation over a period of 2 years. Trust in anonymity was expected to act as a moderator between motivations and the likelihood of repeated survey participation. Participants were $N = 227$ adolescent members of an academic online panel for youth research. Results of longitudinal logistic regression analyses demonstrated a steady decline in the probability of survey participation over time. Extrinsic but not intrinsic motivation significantly increased the probability of initial survey participation, whereas both, extrinsic and intrinsic motivation, buffered the declining probability of survey participation over time; however, only if trust in anonymity was comparably low. These results suggest that the beneficial effects of extrinsic and intrinsic motivations on enduring survey participation are especially prevalent if trust in anonymity is of low to medium size.

Keywords: Online panel, participation rate, extrinsic and intrinsic motivation, incentives, trust in anonymity, longitudinal

Introduction

Low response rates are a major challenge in survey research. Within the last two decades, the average response rates in many fields, such as public opinion and psychological research, have dropped by up to twenty percent (Curtin, Presser, & Singer, 2005; Larson, 2005; Van Horn, Green, & Martinussen, 2009). This problem seems to be particularly prevalent in Web-based research conducted through online panels. An online panel is a pool of individuals who registered at a website and agreed to receive invitations to Web-based surveys on a regular basis (Göriz, 2010). As such, online panels represent an efficient and economic way to continuously recruit participants for online research projects and have achieved great popularity also in the social sciences (Couper, 2005; Göriz, Reinhold, & Batinic, 2002). However, with regard to survey response, online panels are at a disadvantage in two respects: First, surveys conducted through online panels are affected by the general decrease in survey response that each single survey has to face; and second, they also suffer from the survey fatigue of their panelists, who are invited to participate in survey research on a regular basis. It is well documented that repeated survey requests reduce the likelihood that respondents will participate in the future (e.g., Porter, Whitcomb, & Weitzer, 2004). In this respect, in the US, response rates for typical online surveys sent to members of online panels have already dropped to the “low single digits” (Couper & Miller, 2008, p. 833).

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Low response rates generally have undesirable consequences: For example, smaller sample sizes in a particular survey reduce the statistical power to detect hypothesized effects or limit the potential to draw valid generalizations from the sample's results to larger populations. Moreover, response rates that further decline in successive surveys are also detrimental to the overall utility of the panel itself by reducing its representativeness for a given population (cf. Budowski & Scherpenzeel, 2005). Thus, knowledge about factors that counteract the aversive trend of declining participation rates is urgently needed.

Research on factors that may enhance participation has almost exclusively focused on “one-time” surveys. Consequently, little is known about factors that are important for *repeated* survey participation and that are capable to buffer the decline in repeated survey response over time. The present study focuses on the effects of extrinsic and intrinsic motivation on *longitudinal* or *enduring* survey participation in an academic online panel for youth research over a period of two years. Moreover, the impact of the panelists' trust in anonymity on the effectiveness of extrinsic and intrinsic motivation is explored.

Extrinsic and intrinsic motivation

According to self-determination theory (Ryan & Deci, 2000), the driving force behind an individual's behavior is extrinsic and intrinsic motivation. Extrinsic motivation stems from external sources, while intrinsic motivation refers to factors within a person. This implies that individuals are motivated to participate in online panel surveys because of extrinsic reasons, such as the chance to receive material incentives, or intrinsic reasons, such as task enjoyment or topic interest. Research on participation rates in Web-based surveys has typically concentrated on extrinsic motivation by studying whether and how different kinds of material incentives (e.g., lotteries, cash prizes, or redeemable loyalty points) offered to the participants enhance their willingness to participate in a survey (e.g., Deutskens, de Ruyter, Wetzels, & Oosterveld, 2004). Meta-analytical evidence provides mixed support for the effectiveness of material incentives. Cook, Heath, and Thompson (2000) found no evidence in favor of incentives; on the other hand, Göritz (2006) reported a moderate positive effect of incentives on participation rates, but the effects of material incentives, albeit significant, were rather low: Incentives increased the odds of calling up the first page of a survey by about 19% and the odds of finishing a survey by 27%; the effects were stable across various types of incentives and different types of studies (commercial vs. non-profit). More importantly, the long-term effects of incentives on *repeated* survey participation, as expected from members of online panels, are far less pronounced. In a longitudinal three-wave experiment, material incentives after the first survey increased participation rates in the following surveys only marginally (Göritz, Wolff, & Goldstein, 2008). Moreover, the positive effect of initial incentives on participation rates continuously fades with each consecutive survey (Göritz, 2008).

Although the bulk of previous research has concentrated on material incentives, and thus on extrinsic motivation, to boost participation rates, incentives do not represent the only motivational source of individual behavior. People can have a variety of reasons for participating in Web-based surveys that are independent of material incentives offered by the researcher and rather relate to intrinsic motivation. These include (among others) the anticipated enjoyment of participating in survey research (Rogelberg, Spitzmüller, Little, & Reeve, 2006), curiosity or need for cognition, i.e., when individuals like seeking knowledge or thinking about and voicing their opinions, they are more likely to participate (Brüggen & Dholakia, 2010), but also survey-related factors like topic involvement, i.e., when the survey topic is of great interest to the individuals, they are more likely to participate (Groves, Presser, & Dipko, 2004; Van Kenhove, Wijnen, & De Wulf, 2002). Other influential reasons for survey participation are altruistic motives (Singer & Couper, 2008), moral obligations, or normative expectations about the beliefs of an important reference group, i.e., individuals whose friends endorse survey participation are more inclined to participate themselves (Bosnjak, Tuten, & Wittmann, 2005). However, most previous research did not study the effect of intrinsic motivation on participation rates directly, but inferred the effects from the *intention* to participate. Although behavioral intentions are predictive of actual behavior, they are only rough indicators that are influenced by various factors (cf. Sheppard, Hartwick, & Warshaw, 1988). Rogelberg and colleagues (2006), for example, reported a rather small correlation of $r = .14$, between the intention to participate in a survey and the actual survey response; Bosnjak and colleagues (2005), on the other hand, found a moderate correlation of $r = .40$.

In line with results of previous studies, we hypothesize that extrinsic and intrinsic motivation increase the overall likelihood that a panelist will participate in a particular survey. Additionally, we expect that extrinsic motivation and intrinsic motivations also have a positive impact on the panelists' *enduring* survey participation.

H1a. Extrinsic motivation and intrinsic motivation increases the likelihood of survey participation.

H1b. Extrinsic motivation and intrinsic motivation reduces the decrease in survey participation in consecutive surveys.

Trust in anonymity

Social-exchange theory (Thibaut & Kelly, 1959; Westin, 1967) states that individuals weigh expected benefits against potential costs before carrying out an action, such as participating in a survey. While benefits stemming from extrinsic and intrinsic motivation can increase participation rates, a number of “cost” factors may also decrease participation rates. Concerns about anonymity and data security represent one such cost factor that can significantly reduce participation rates, particularly in Web-based surveys (Cho & Larose, 1999; Rogelberg et al., 2006). Generally, when participants worry about the lack of anonymity, they are more reluctant to disclose personal information (e.g., Joinson & Paine, 2007; Joinson, Reips, Buchanan, & Paine Schofield, 2010; Udo, 2001). Moreover, privacy concerns increase item non-response, especially in case of sensitive items (Joinson, Woodley, & Reips, 2007), and they can also severely reduce participation rates; for example, if employee surveys are conducted within closed intranet systems that are only accessible after providing a username and password (Thompson & Surface, 2007). Explicit privacy assurances, on the other hand, significantly increase participation rates (Hui, Teo, & Lee, 2007). Similarly, participants’ *trust* in privacy protection increases information disclosure in e-commerce (Gefen, Karahanna, & Straub, 2003; Xu, Tan, & Hui, 2003), as it helps to reduce perceived risks such as violations of privacy (Culnan & Armstrong, 1999).

Privacy protection issues seem all the more important for surveys conducted through online panels, as panel members usually provide highly personal information (including their name and email address) during registration. Put another way, in online panels, an individual is confronted with privacy issues in two stages: First, when he or she decides whether or not to register, and second, when he or she decides whether or not to participate in surveys. In this study, we address the latter and propose that a panelist’s participation in a survey will depend on the panelist’s trust in anonymity. More precisely, if a panelist trusts the panel provider to treat personal data and information anonymously, he or she is expected to have higher participation rates in general, and also a lower decline in survey participation rates over time.

H2a. Trust in anonymity increases the likelihood of survey participation.

H2b. Trust in anonymity reduces the decrease in survey participation in consecutive surveys.

Moreover, trust in anonymity may also represent a precondition for motivations to influence survey participation (cf. Hwang & Burger, 1997). According to this line of reasoning, trust does not drive behavior, i.e., survey participation, directly, but determines how individuals direct their energy (cf. Dirks, 1999): As discussed before, most behavior is motivated by extrinsic (e.g., receiving a material incentive) and intrinsic goals (e.g., voicing opinion). When trust in anonymity is low, the perceived costs of survey participation are rather high. In this case, individuals are less likely to direct their energy towards survey participation in order to achieve their extrinsic and intrinsic goals. Rather, they will direct their energy towards other tasks through which they achieve the same extrinsic and intrinsic goals more easily. Hence, only when individuals have sufficient trust in the anonymity of their data may extrinsic and intrinsic motivation affect their participation behavior. In line with this assumption, trust was found to act as a moderator between organizational attitudes and various work-related behaviors (Dirks, 1999; Dirks & Ferrin, 2001). Furthermore, in an e-commerce study conducted by Xu and colleagues (2003), trust moderated the relationship between consumers’ reward preferences/privacy concerns and their intention to disclose information. Similarly, we propose that trust in anonymity does not only directly affect participation rates, but also that trust moderates the effects of extrinsic and intrinsic motivation. The hypothesized positive effect of extrinsic and intrinsic motivation on participation rates in general as well as the expected buffering effect of extrinsic and intrinsic motivation on the decline in participation rates over time should be more pronounced when individuals trust in the anonymity of the survey and the panel’s privacy protection issues.

H3a. Trust in anonymity enhances the positive effects of extrinsic and intrinsic motivation on the likelihood of survey participation.

H3b. Trust in anonymity enhances the positive effects of extrinsic and intrinsic motivation on enduring survey participation, i.e., the change in survey participation in consecutive surveys.

Overview of the present study

In contrast to most previous research focusing on determinants of survey participation for a single survey only (e.g., Deutskens et al., 2004; Rogelberg et al., 2006), the present study concentrates on *enduring* survey participation in multiple, successive surveys. The latter is essential for members of online panels, who are expected to participate on a regular basis and who should ideally display a high participation rate over a longer period of time and in numerous surveys. We analyze the participation behavior in a series of surveys for a sample of students from an academic online panel for youth research in a longitudinal prospective design.

Although most online panels almost exclusively focus on adults, online panels also represent an attractive method of data collection for youth research in particular: Most teens in Western societies have been socialized by the Internet throughout their childhood; they are used to the Internet and many of its applications. For example, adolescents spend much of their leisure time on Web-based multi-user games (Holtz & Appel, 2011), interacting with each other on social networking sites (e.g., Facebook; Pempek, Yermolayeva, & Calvert, 2009) or exchanging music and photos in virtual communities (Correa, 2010). Hence, participation in Web-based surveys should not be that unfamiliar to them. Beyond that, adolescents are typically more open and honest in Web-based questionnaires than in traditional paper-and-pencil questionnaires: For example, in Web-based assessments, adolescents report a higher prevalence of violence, drug use (Turner et al., 1998; Wu & Newfield, 2007), and sexual behavior (Hewett, Mensch, & Erulkar, 2004). This indicates that online panels are an attractive and fruitful method for social scientists to collect self-reported data also from adolescents.

As in most longitudinal studies (e.g., Hiskey & Troop, 2002; Porter et al., 2004), we expect participation rates to decrease continuously with the number of surveys conducted through the online panel. However, in line with our hypotheses, we also expect extrinsic motivation and intrinsic motivation to buffer the decline in participation rates, resulting in a smaller decline for participants with high motivations (H1). Furthermore, we also expect trust in anonymity to limit the decline in participation rates in successive surveys (H2) and, moreover, to enhance the positive effects of extrinsic and intrinsic motivation (H3). In this online panel, survey participation is rewarded by taking part in a lottery. As to extrinsic motivation, we therefore consider whether an adolescent had won in the lottery and thus had received a material incentive or not; as to intrinsic motivation, we consider a-priori self-reports on the strength of several intrinsic motives for participating in the online surveys (interest, joy, and voicing opinion).

Method

Participants and procedure

Participants were members of an academic online panel with students of secondary schools across rural and urban localities in Austria. The panel was established in 2009 and can be classified as a volunteer double opt-in panel (Görritz et al., 2002). The panelists were recruited in line with national laws and ethical standards all over the country. The registration for the panel was voluntary and required personal identification, including name and email address. After the sign-up process, new panelists were requested to complete a master data survey regarding basic socio-demographic information and general interests. The participation in all online surveys was anonymous and voluntary. As a minor incentive for their participation, panelists were eligible to win one of various larger (e.g., iPod) or smaller prizes (e.g., free cinema tickets) sponsored by local companies.

Table 1
Overview of the Surveys Conducted in the Online Panel and Participation Rates for the Current Sample

Survey	Topic	Items	Reminders	Survey starts	Participation rate
1	Sports	35	1	185	89.4%
2	Instructional methods	52	1	197	93.8%
3	Panel usability I	39	1	229	100.0%
4	New types of school	58	1	163	72.1%
5	Travelling	32	2	152	67.0%
6	Fairtrade products	37	1	130	57.5%
7	Career choice	20	1	117	51.8%
8	Well-being I ^a	35	1	112	50.0%
9	Well-being II ^a	61	1	106	47.7%
10	Internet use and computer games	47	1	101	44.1%
11	Well-being III ^a	36	1	100	45.0%
12	Foreigners	20	0	95	42.0%
13	Cell phones	47	2	100	43.7%
14	Well-being IV ^a	54	1	98	42.8%
15	Gender	50	2	89	38.9%
16	Well-being V ^a	54	1	82	35.8%
17	Panel usability II	48	2	82	35.8%

^aLongitudinal study over five waves.

At the time of this research, $N = 1836$ individuals had registered and had been invited to participate in at least one of a series of 17 surveys (excluding the master data survey). Table 1 gives an overview of these surveys. The

results regarding the hypotheses reported in this paper are based on a sub-sample of panelists who provided full data in the first usability survey, which had been conducted to evaluate the panel and to improve the survey experience for the students (Survey 3 in Table 1; see Appendix for a screenshot of the survey). The sample of this survey consists of $N = 229$ students (172 female) between the ages of 11 and 20 ($M = 16.74$; $SD = 1.86$) who were panel members for 2.36 months on average ($SD = 0.86$; range: 1–5). The longitudinal analyses of survey participation behavior are based on the 14 surveys (Surveys 4 to 17 in Table 1) administered after the usability survey.

Measures

Survey Participation. The dependent variable was a binary indicator of survey participation for each of the 14 surveys (Surveys 4 to 17 in Table 1), with 0 indicating survey non-response and 1 indicating survey response. In total, there were 3173 behavioral indicators of survey participation of the 229 individuals¹. Initially, we also included a measure of survey retention, which indicated whether a participant who had started a survey also finished it. However, these two indicators, survey participation and survey retention, were highly correlated, $r = .94$, $p < .001$ (cf. Figure 1). Hence, we refrain from reporting the results for survey retention separately.

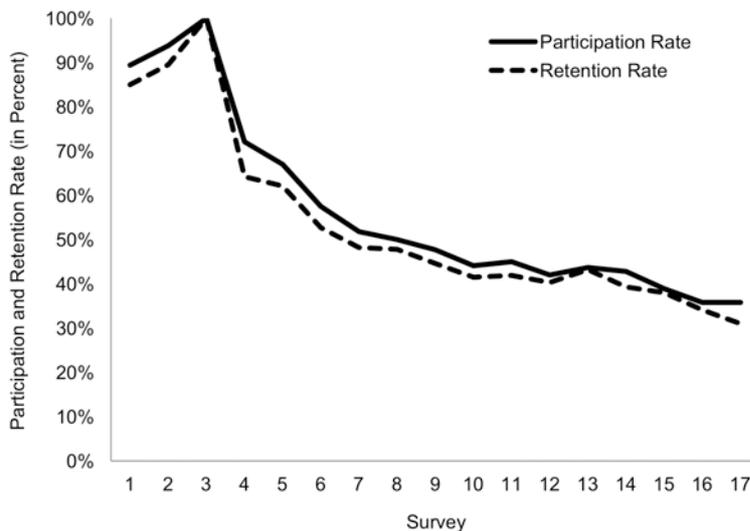


Figure 1. Participation and Retention Rates over the 17 Surveys.

Extrinsic Motivation. In each survey, participants were eligible to win one of several prizes that were awarded in a lottery. About 13% ($N = 29$) of all participants received such an incentive in one of the surveys. The winning of such a prize was used as a behavioral indicator of extrinsic motivation. For each survey a dichotomous variable was created, indicating if an individual had received a prize in any previous survey or not.

Intrinsic Motivation. Intrinsic motivation was measured with four self-report items: “I participate because I have the opportunity to express my opinion about a topic”, “I participate because I am interested in the results”, “I participate because I am interested in the survey topics”, and “I participate because it is fun to do online surveys” (the original items were in German). Responses were scored on a 5-point scale from *do not agree at all* to *agree completely*. The index for intrinsic motivation represents the mean response to the four items. Cronbach’s alpha reliability was satisfactory at $\alpha = .78$.

Trust in Anonymity. Trust in anonymity was measured with two self-report items: “I trust that my responses are anonymous” and “I trust that my data are treated anonymously” (original items in German). The response options ranged from 1 (*do not agree at all*) to 5 (*agree completely*). The index represents the average response to the two items. With a Cronbach’s alpha of $\alpha = .90$ the reliability was good. As the majority of individuals reported very high trust in anonymity ($M = 4.49$), this variable was dichotomized by means of a median-split, with 0 indicating lower trust in anonymity ($n = 80$) and 1 indicating very high trust in anonymity ($n = 149$).

¹As not all of the $N = 229$ participants had been invited to all of the 14 surveys following the first usability survey, there are $N = 3173$ behavioral indicators of survey response vs. non-response rather than $N = 220 \times 14 = 3206$.

Table 2
 Logistic Mixed-Effects Regression Analyses for Survey Participation

	Model 1		Model 2		Model 3		Model 4		Model 5	
	<i>B (SE)</i>	OR	<i>B (SE)</i>	OR	<i>B (SE)</i>	OR	<i>B (SE)</i>	OR	<i>B (SE)</i>	OR
1. Intercept	1.08 (0.16)***	2.96	1.00 (0.16)**	2.72	1.19 (0.29)**	3.29	1.16 (0.30)**	3.18	1.04 (0.74)	2.84
2. Slope of time trend	-0.21 (0.03)***	0.81	-0.22 (0.03)***	0.80	-0.22 (0.04)***	0.80	-0.21 (0.04)***	0.81	-0.21 (0.04)***	0.81
<i>Main effects on average survey participation (intercept)</i>										
3. Extrinsic motivation ^a			2.18 (0.85)*	8.84	2.18 (0.85)*	8.81	0.62 (1.21)	1.85	0.61 (1.17)	1.84
4. Intrinsic motivation			0.21 (0.16)	1.24	0.25 (0.16)	1.28	-0.06 (0.27)	0.94	-0.11 (0.27)	0.90
5. Trust in anonymity ^b					-0.29 (0.36)	0.75	-0.30 (0.36)	0.74	-0.35 (0.34)	0.71
<i>Main effects on enduring survey participation (time slope)</i>										
6. Extrinsic motivation ^a			-0.03 (0.12)	0.97	-0.03 (0.12)	0.97	0.21 (0.11) ⁺	1.23	0.20 (0.11) ⁺	1.22
7. Intrinsic motivation			0.03 (0.03)	1.03	0.03 (0.03)	1.03	0.13 (0.05)**	1.14	0.13 (0.05)**	1.14
8. Trust in anonymity ^b					0.01 (0.05)	1.01	0.01 (0.05)	1.01	0.01 (0.05)	1.01
<i>Moderation effects on average survey participation (intercept)</i>										
9. Interaction 3 x 5							2.47 (1.62)	11.85	2.47 (1.60)	11.83
10. Interaction 4 x 5							0.44 (0.34)	1.56	0.50 (0.34)	1.64
<i>Moderation effects on enduring survey participation (time slope)</i>										
11. Interaction 6 x 8							-0.40 (0.21) ⁺	0.86	-0.39 (0.21) ⁺	0.68
12. Interaction 7 x 8							-0.15 (0.06)**	0.67	-0.15 (0.06)**	0.86

(continued)

Table 2
 Logistic Mixed-Effects Regression Analyses for Survey Participation (continued)

	Model 1		Model 2		Model 3		Model 4		Model 5	
	<i>B (SE)</i>	OR								
<i>Covariates</i>										
13. Sex ^c									-0.46 (0.35)	0.63
14. Age									0.00 (0.09)	1.00
15. Membership duration									0.02 (0.18)	1.02
16. Number of reminders									0.11 (0.09)	1.11
17. Survey length									0.01 (0.00)	1.01
<i>Random variance components</i>										
Intercept	3.63 (1.91) ^{***}		3.45 (1.86) ^{***}		3.44 (1.85) ^{***}		3.34 (1.83) ^{***}		3.48 (1.87) ^{***}	
Slope	0.09 (0.29) ^{***}		0.08 (0.28) ^{***}							
Deviance (<i>k</i>)	8108 (5)		8108 (9)		8106 (11)		8111 (15)		8113 (20)	

Note. $N_{\text{Level 1}} = 3173$; $N_{\text{Level 2}} = 229$; OR = odds ratio; *k* = number of parameters in model. Logistic mixed effects regression with full information maximum likelihood estimation. Dependent variable is a binary indicator for survey participation (0 = no participation; 1 = participation).

^a0 = no incentive; 1 = incentive.

^b0 = low trust in anonymity; 1 = high trust in anonymity.

^c0 = female; 1 = male.

*** $p < .001$. ** $p < .01$. * $p < .05$. † $p < .06$.

Covariates. Several additional variables were included as covariates to control for potential confounds that might attenuate the effects of motivation and trust in anonymity on survey participation. To control for individual differences in survey fatigue (Porter et al., 2004), we included the length of panel membership, i.e., the number of months a participant had been enrolled in the panel prior to the current survey. Moreover, differences between the 14 surveys were acknowledged in two ways: First, the survey length was measured as the number of items in the total survey. Second, to account for the different numbers of invitations sent out, we also included the number of reminders per survey (see Table 1).

Data analyses

The individuals’ participation behaviors are nested within persons; i.e., for each individual, data on participation in various surveys was available. To account for the hierarchical structure of the data, we used logistic mixed-effects regression analyses (Wong & Mason, 1985) and modeled the data at two levels. Level 1 refers to the 14 surveys, with a total of 3173 binary indicators of survey participation, whereas Level 2 represents the $N = 229$ participants. We used linear growth modeling (Bryk & Raudenbush, 1987) to estimate the growth trajectory of survey participation (i.e., the decreasing participation rate) over time, and coded time using consecutive integers starting from zero. In this model, the intercept at Level 1 represents the initial probability of participation in the first survey (Survey 4 in Table 1), and the Level 1 slope of time is an indicator of enduring participation in the consecutive surveys. A slope around zero would indicate a constant probability of survey participation in all 14 surveys, whereas a negative slope would suggest a decreasing probability of participation with successive survey requests. Accordingly, our moderation analyses focus on the intercept parameter as an indicator of initial survey participation behavior and the slope parameter as an indicator of enduring survey participation behavior. In total, we estimated five hierarchical models (see Table 2) in HLM 7 using a full information maximum likelihood algorithm (Raudenbush, Bryk, & Congdon, 2010).

Results

The means, standard deviations, and zero-order correlations of all variables are summarized in Table 3. The average participation rate for the 14 surveys was 48% ($SD = 10$ percentage points); thus, in a given survey, about half of the panelists who were invited actually started the survey. As illustrated in Figure 1, the participation rates gradually declined in successive surveys, which mirrors the overall decline in response rates typically encountered in longitudinal studies (e.g., Hiskey & Troop, 2002). As expected, extrinsic motivation, $r = .35, p < .001$, and intrinsic motivation, $r = .13, p = .042$, were positively related to the participation rate, whereas trust in anonymity was not, $r = .06, p = .384$. Moreover, the two self-report measures, intrinsic motivation and trust in anonymity, were modestly correlated, $r = .33, p < .001$.

Table 3
Means, Standard Deviations, and Intercorrelations for the Studied Variables

Variable name	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
Criterion								
1. Participation rate	0.48	0.10						
Predictors								
2. Extrinsic motivation ^a			.35*					
3. Intrinsic motivation	3.79	0.92	.13*	-.05				
Moderator								
4. Trust in anonymity	4.49	0.83	.06	-.05	.33***			
Covariates								
5. Sex ^b			-.15*	-.07	-.09	-.11		
6. Age ^c	16.74	1.82	-.04	-.12	-.12	.01	.00	
7. Membership duration ^d	2.36	0.86	.01	.06	.08	-.07	.03	-.35*

Note. $N = 229$.

^a0 = no prize won; 1 = prize won.

^b0 = female; 1 = male.

^cIn years.

^dIn months.

*** $p < .001$. * $p < .05$.

Prior to testing the hypothesized mixed-effects models (see Table 2), a null model for the intercept without any additional variables was estimated. Mixed-effects models are only appropriate in the presence of significant within-individual variance. The within-individual variance component, $\delta^2 = 4.51$, was significant at $p < .001$, and

the intra-class correlation coefficient fell at $ICC = .58$ (Snijders & Bosker, 1999), indicating that 58% of the total variability in the responses was between individuals and 42% within individuals.

In the first step, we modeled the linear decrease in individual survey participation without including any predictors. In line with the descriptive results illustrated in Figure 1, Model 1 in Table 2 exhibited a significant negative slope, odds ratio² (OR) = 0.81, $p < .001$, of the linear time trend, which indicates that the probability of survey participation decreased with consecutive survey invitations. Furthermore, both the intercept and the slope exhibited a significant, $p < .001$, random variance component. Hence, the intercept, that is, the initial probability of survey participation, and the slope, that is, the change in the probability of survey participation in successive surveys, significantly varied between individuals.

In Model 2 (see Table 2), we added the main effects of extrinsic motivation and intrinsic motivation on the random intercept and slope. To facilitate the interpretation of the results, intrinsic motivation was standardized prior to inclusion in the model. Extrinsic motivation significantly predicted the intercept, $OR = 8.84$, $p < .001$; the effect of intrinsic motivation pointed in the same direction but was not significant, $OR = 1.24$, $p = .173$. Hence, extrinsic motivation is a relevant indicator of an individual's initial participation probability in a given survey. However, neither motivation was significantly, $p > .05$, related to the time slope; this means that the main effects of extrinsic or intrinsic motivation alone cannot explain individual differences in the decrease in survey participation over time.

We hypothesized that trust in anonymity affected participation rates directly and also indirectly by moderating the main effects of extrinsic and intrinsic motivation. In the next steps, we included the main effects of trust in anonymity (Model 3) and its interactions with extrinsic and intrinsic motivation (Model 4) on the random intercept and slope. Neither the main effect of trust in anonymity alone nor its interactions with motivation predicted the intercept. Trust in anonymity did not influence the initial probability of survey participation. However, in line with our hypothesis, trust in anonymity is pivotal for understanding individual differences in the decrease in survey participation. Trust in anonymity significantly moderated the effect of extrinsic motivation, $OR = .67$, $p = .057$, and intrinsic motivation, $OR = .86$, $p = .009$, on the time slope (Model 4). These results were rather stable, for they hardly changed, even when including various covariates (Model 5).

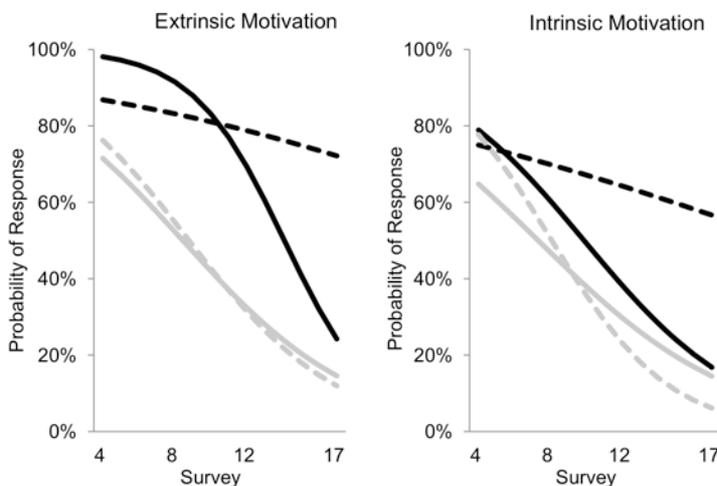


Figure 2. Interaction Between Motivations and Trust in Anonymity on Enduring Probability of Survey Participation Across Multiple Surveys. Black vs. Grey Lines Indicate High vs. Low Motivation (Having Won a Prize vs. Not, for Extrinsic Motivation; $-1 SD$ vs. $+1 SD$, for Intrinsic Motivation) and Solid vs. Dashed Lines Represent High vs. Low Trust in Anonymity.

The interaction plot in Figure 2 displays the growth trajectories of survey participation for high and low values of motivation and trust in anonymity. On average, survey participation was higher for individuals who reported high rather than low motivation (black lines in Figure 2). The decrease in the probability of successive survey participations for individuals who had low motivation (grey lines) was as considerable as for individuals who had high motivation and high trust in anonymity (solid black line). However, in the presence of low trust in anonymity, high motivation buffered the decrease in subsequent survey participations (dashed black line). Extrinsic and intrinsic motivation revealed a highly similar pattern (see Figure 2). Simple slope analyses (see

²Odds ratios have an expectancy of 1. Hence, negative unstandardized regression parameters correspond to odds ratios between 0 and 1, whereas positive regression parameters result in odds ratios greater than 1.

Table 4) corroborated these descriptive results and confirmed a significant negative effect of the time trend for all participants except for those with high extrinsic or intrinsic motivation and low trust in anonymity, $p > .05$. In other words, in combination with low trust in anonymity, extrinsic and intrinsic motivation counteract the decreasing probability of survey participation.

Table 4

Simple Slopes of Time for High vs. Low Motivations and Trust in Anonymity on Survey Participation Probability

Variable name	B	SE	p
Extrinsic motivation			
Low motivation, low trust	-0.24	0.04	< .001
Low motivation, high trust	-0.21	0.03	< .001
High motivation, low trust	-0.07	0.11	.498
High motivation, high trust	-0.39	0.18	.033
Intrinsic motivation			
Low motivation, low trust	-0.31	0.06	< .001
Low motivation, high trust	-0.18	0.05	< .001
High motivation, low trust	-0.06	0.07	.380
High motivation, high trust	-0.22	0.04	< .001

Note. High vs. low values of intrinsic motivation represent one standard deviation below or above the mean.

Discussion

Data collection via Web-based surveys has gained unprecedented importance over the last two decades, both in commercial and academic research (cf. Couper & Miller, 2008; Dillman & Bowker, 2001). However, low and continuously declining participation rates are a major nuisance that seriously limit the advantages of online panel studies. In this study, we analyzed the effects of extrinsic and intrinsic motivation and trust in anonymity on *enduring* survey participation in an academic adolescent online panel over two years. Motivations and trust in anonymity revealed different effects on initial survey participation (intercept) and on enduring, repeated survey participation (slope). First, extrinsic motivation, that is, having received an incentive, significantly increased the initial probability of survey participation, whereas neither intrinsic motivation nor trust in anonymity had an effect, giving partial support to H1a and no support to H2a and 3a. Second, as to *enduring* survey participation, H1b and H2b were not supported, as neither motivation nor trust in anonymity alone could explain the decline in the survey participation over time. Third, in line with H3b, trust in anonymity moderated the effects of extrinsic motivation and intrinsic motivation on the probability of repeated survey participation. However, contrary to initial expectations, motivations buffered the decline in survey participation only in the presence of low trust in anonymity but not in the case of high trust in anonymity.

In general, having won a prize in a previous survey as an extrinsic motivational factor, positively affected participation rates. The size of this effect was rather high, with an odds ratio in favor of incentives of 8.84, as compared to the overall odds ratio of 1.19 reported in the meta-analysis by Göritz (2006). It should be noted that the results of the present study apply for adolescents, whereas most research on the effectiveness of incentives has been conducted on adults. Thus, incentives might be more effective in increasing participation rates in adolescents than in adults. Contrary to our expectations, intrinsic motivation had no main effect on initial participation rates. On the one hand, this result is somewhat at odds with previous research on behavioral intentions, which found substantial correlations with, for example, moral obligation to participate (Bosnjak et al., 2005), survey enjoyment (Rogelberg et al., 2006), as well as curiosity or need for cognition (Brüggen & Dholakia, 2010). On the other hand, however, it is in line with research on the effect of extrinsic rewards on intrinsic motivation. Frequently, extrinsic rewards undermine the formation and enduring maintenance of intrinsic motivation (Deci, Koestner, & Ryan, 1999). Hence, intrinsic motivation might yield a stronger effect on participation rates when no extrinsic motivators are present.

Interestingly, both extrinsic motivation and intrinsic motivation were beneficial for *enduring* survey participation, though not in the case of high trust in anonymity, but rather in the case of comparably low trust in anonymity. In other words, material incentives and intrinsic motivation could compensate for the overall decline in the probability of survey participation only if a panelist's trust in anonymity was comparably low. Although the pattern of the interaction between motivations and trust in anonymity was quite contrary to expectations, these results do not necessarily contradict the hypothesized mechanism. We hypothesized that trust in anonymity was a precondition for motivations to work (cf. Dirks, 1999). However, given that trust in anonymity was rather high in the present sample ($M = 4.49$, $SD = 0.83$, $Median = 5$, with a 5-point scale) and that even individuals who

reported comparably low trust in anonymity ($M = 3.55$, $SD = 0.77$, $Median = 3.50$) did not completely lack trust in anonymity, the hypothesized precondition for motivations to work was present *in general*. Thus, it might be speculated that, although medium to high trust in anonymity seems beneficial for motivations to work, excess levels of trust in anonymity might offset this positive effect and result in decreasing participation rates.

Limitations and implications for future research

The generalizability of the results presented might be impaired by some limitations. One limitation pertains to the fact that not all panel members participated in the first usability survey (Survey 3 in Table 1) and thus did not provide information on their intrinsic motivation and trust in anonymity. Hence, those who participated might represent a rather selective group: For example, they had, on average, a higher overall participation rate (48%) as compared to the participation rate of all panelists (23%). However, the participation rates of the current sample also showed a very high variability, which may slightly mitigate this issue. Another limitation relates to the type of incentive used as an indicator of extrinsic motivation that was implemented in the form of a lottery. Participants were not guaranteed but only had a small chance to actually receive a material incentive (usually to win one of three to five prizes). Some research suggests that prepaid incentives might elicit higher response rates than lottery prizes (Porter, 2004; Ulrich et al., 2005). Hence, future studies are encouraged to study the interactive effects between trust in anonymity and different kinds of incentives (e.g., incentives that are guaranteed for all participants) on initial and enduring survey participation. Moreover, these results have to be interpreted in the light of the specific panel studied, a non-commercial academic panel for youth research. In adult or commercial panels, for example, intrinsic and extrinsic motivation and trust in anonymity might be of different importance. Thus, the findings do not allow for universal conclusions for all types of panels currently in use, but hint at an important mechanism involved in survey participation, which may also be worth studying under different conditions in the future.

Despite these limitations, the present study contributes to the body of research on survey participation in at least three ways: First, it complements previous research on participation *intentions* (Bosnjak et al., 2005; Rogelberg et al., 2006) by using actual participation behavior as its dependent variable. Second, the study extends experimental research on the effectiveness of incentives by looking at *longitudinal* participation behavior. Most previous research demonstrated the effectiveness of incentives for a single study only. The present findings, however, are about enduring participation of panel members in Web-based surveys over a long period of time (over two years). Beyond that, the results throw light on diverging findings on the effectiveness of extrinsic and intrinsic motivation for survey participation by taking into account the level of trust in anonymity of participants as a moderator variable.

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Appendix



17%

Zunächst möchten wir von dir wissen, warum du an unseren Befragungen teilnimmst.

Ich nehme an Umfragen des Opinioncorner teil, weil ...

	trifft nicht zu	trifft eher nicht zu	trifft teils/teils zu	trifft eher zu	trifft zu
... ich dadurch die Möglichkeit habe, meine Meinung zu einem Thema zu äußern.	<input type="radio"/>				
... ich Preise gewinnen kann.	<input type="radio"/>				
... meine Antworten für wissenschaftliche Zwecke genützt werden.	<input type="radio"/>				
... ich gerade nichts Besseres zu tun habe.	<input type="radio"/>				
... ich an den Ergebnissen interessiert bin.	<input type="radio"/>				
... die Themen interessant waren.	<input type="radio"/>				
... es Spaß macht, die Umfragen auszufüllen.	<input type="radio"/>				

Weiter

Figure A1. Screenshot of the Usability Survey.