

## **Will They Stay or Will They Go? Personality Predictors of Dropout in an Online Study**

Steffen Nestler<sup>1</sup>, Meinald Thielsch<sup>1</sup>, Elena Vasilev<sup>1</sup>, Mitja D. Back<sup>1</sup>

<sup>1</sup>University of Muenster

---

**Abstract:** We examined whether the Big Five personality dimensions and choice of reimbursement (participating in a lottery for a coupon vs. personality feedback) were related to respondents' motivation to continue filling out an online survey. A total of 3,013 individuals took part in an online study that asked them to rate a number of items separated into different question blocks. Using discrete-time survival analysis (DTSA), we found that Openness, Agreeableness, Conscientiousness, and choosing to receive personality feedback had negative effects on dropout: They were related to a *lower* probability of quitting the survey. Furthermore, the effects of all four variables were mediated by satisfaction with the questionnaire in the previous question block. Practical implications for online research and implications regarding the role of personality in research participation in general are discussed.

**Keywords:** Online Research, Web-Survey Research, Big Five Personality Measurement, Dropout, Nonresponse

---

### **Introduction**

In recent decades, the Internet has experienced a massive growth in the number of users. Nowadays, 70% of the people living in developed countries are using it (ITU, 2012). Importantly, the World Wide Web is also increasingly used to conduct experimental as well as survey-based research (Birnbaum, 2004; Reips, 2002a). The reason for this is that the web offers several advantages for data collection (for an overview, see Reips, 2002a). Besides the round-the-clock accessibility of studies, these positive effects comprise location-independent data collection, cost savings, and smaller social desirability effects (e.g., Kreuter, Presser, & Tourangeau, 2009; Pealer et al., 2001). Importantly, the results of web research are comparable to lab studies as are the motivation and the characteristics of online participants (e.g., Cronk & West, 2002; Skitka & Sargis, 2006).

Despite these clear advantages, however, there is one major drawback: the lack of control over test situations and participants. For example, it is quite easy for participants to quit a study before completing it. From an online researcher's point of view, a main goal is to eliminate or to reduce this dropout. However, because a considerable number of people are dropping out of nearly every web-based study (e.g., Göritz, 2006), a second goal seems almost more important: understanding dropout. Whereas some design-related measures have been found to influence dropout, it is yet unclear whether personality influences it. The present study aimed to provide a better understanding of the relation between individual differences and dropout.

## **Determinants of Online Participation and Dropout**

Given the increase in the use of online methods in psychological research, an increasing number of studies have focused on methodological questions to provide a better understanding of such new methods of data collection. Research has shown that web-based surveys provide access to heterogeneous samples (Buhrmester, Kwang, & Gosling, 2011) and to persons with rare conditions (Mangan & Reips, 2007). Concerning sample size, the situation is not clear-cut: When convenience sampling is applied, web-based surveys often yield satisfactory sample sizes, but when representative approaches are applied, response rates are sometimes disappointing (Dillman, Reips, & Matzat, 2010). Volunteer or household panels were therefore established to meet this challenge regarding sampling (Dillman et al., 2010; Göritz, 2006).

### *Response Rates*

More recent studies have focused on the influence of methodological features of online surveys on response rates (i.e., taking part in an online study; for an overview, see Fan & Yan, 2010). For example, research has shown that financial incentives as well as personal salutations in email invitations increase the likelihood that individuals will participate in an online survey (Göritz, 2006), although the latter relation depends on the power held by the person or institution that sent the invitation (Joinson & Reips, 2007). Similarly, Porter and Whitcomb (2005) showed that women and individuals with high values on investigative and enterprising personalities are more likely to participate in an online study. Rogelberg and Stanton (2007) found that a series of actions such as prenotifying participants, providing contact information, or providing feedback raised response rates. Reminders are often suggested as these tend to have a positive effect on response rates (as shown in Göritz & Crutzen's, 2011, meta-analysis). Finally, ensuring anonymity and providing cues that suggest integrity increase the likelihood of participation (e.g., Thompson & Surface, 2007). However, a major drawback of web-based research is that individuals who begin the survey are able to quit the survey any time prior to completion (i.e., *dropout*). In fact, online assessment makes it more likely that participants will actually quit early as compared to offline assessment (Birnbaum, 2004; Reips, 2002a, 2002b).

### *Dropout*

Dropout is particularly problematic in online research as the number of participants who prematurely terminate an online survey is greater than the number of participants who tend to quit a classic laboratory research session (Birnbaum, 2004; Hoerger, 2010; Reips, 2002a, 2002b). Bosnjak (2001) classified online nonresponse by using the common differentiation between complete responders, item nonresponders (people who skip some items), and unit nonresponders (people who are not willing or able to participate in a survey and do not answer any questions). He additionally identified several other response patterns in web-based surveys: First, there are people called answering dropouts who provide answers to the displayed questions but quit a study prior to completing it. Second, lurkers view all of the questions on the survey but do not answer any of them. Third, lurking dropouts are a combination of answering dropouts and lurkers; and finally, item nonresponding dropouts include people who view some of the questions, answer some but not all of the questions viewed, and quit before completing the survey.

In contrast to item nonresponding (i.e., participants skip some items), lurking (i.e., individuals look at all survey items but do not answer any of them), or unit nonresponding (i.e., individuals are not motivated to even begin the online survey; see Bosnjak, 2001), dropout cannot be technically controlled. It is therefore important to understand why some individuals quit a study after answering some items. Can the reason be found in the features of the study (i.e., design features), or are there aspects that reside within the respondents (i.e., personality)?

### *Understanding Dropout: Design Features*

A number of experiments have investigated how design features influence dropout (e.g., Frick, Bächtiger, & Reips, 2001; O'Neil & Penrod, 2001; O'Neil, Penrod, & Bornstein, 2003; see also Knapp & Heidingsfelder, 2001). For example, dropout rates can be decreased by using a short questionnaire, asking for personal information at the beginning of a questionnaire, and offering the chance to win a prize or money in a lottery (for a thorough overview, see Göritz, 2006). Furthermore, whereas progress indicators seem to decrease the dropout rate, open questions and long loading times tend to increase dropout. But even when a web-based study is perfectly optimized in terms of design features, dropout occurs to a substantial degree (cf. Göritz & Wolff, 2007), and one might ask whether this dropout really occurs randomly?

*Understanding Dropout: The Potential Role of Personality*

One factor that has received, to the best of our knowledge, little attention is that of interindividual differences between online participants. This is interesting insofar as personality measures have been found to predict a variety of (online and offline) social behaviors (Back, Schmukle, & Egloff, 2009; Funder, 2001; Stopfer, Egloff, Nestler, & Back, 2014) that are relevant to experimenting. Some studies have shown that personality is associated with participation behavior in classical laboratory studies. For example, Back, Schmukle, and Egloff (2006) showed that participants' Agreeableness and Conscientiousness predicted time of arrival at the laboratory. Similarly, Aviv, Zelenski, Rallo, and Larsen (2002) found that whereas extraverts participated later in the semester in psychological experiments, individuals high in Conscientiousness and Openness participated earlier. Finally, Agreeableness is positively related to whether a person reports to enjoy participating in experiments (Aviv et al., 2002).

However, only a few studies have dealt with the effects of personality on online response behavior. Rogelberg and Stanton (2007) found that participants who did not participate in a follow-up online survey were less conscientious and agreeable. It should be noted, however, that this study comprised a relatively small sample ( $N = 405$ ), consisting mostly of females, with fewer than 100 respondents who responded to the follow-up surveys. Marcus and Schütz (2005) asked independent observers ( $N = 119$ ) to judge the personalities of website owners on the basis of the owners' personal websites. These website owners were then invited to take part in a personality survey. Results showed that website owners who did not participate in the online personality survey (59% of  $N = 685$ ) were judged as less agreeable and less open by independent observers. Furthermore, they were judged to be higher in Extraversion and higher in Narcissism. Brügger and Dholakia (2010) asked 751 individuals to fill out a number of personality questionnaires in different online surveys. Those individuals who completed at least one online survey had higher scores on Need for Cognition, Curiosity, Agreeableness, and Openness to survey participation. In addition, Curiosity and Conscientiousness predicted the overall number of completed surveys. Finally, Frick, Neuhaus, and Buchanan (2004) found that high values on Conscientiousness were associated with fewer item nonresponses. Thus, there is preliminary evidence that personality affects online response behavior. But to the best of our knowledge, no published study has yet examined the effect of personality on the dropout rate for online surveys.

### **The Present Study**

The present study aimed to examine the influence of personality on dropout by having more than 3,000 individuals participate in an online survey. Before beginning, they had to choose whether they wanted to be reimbursed by participating in a lottery for a coupon or by receiving personality feedback. Then they were asked to fill out a 15-item measure of the Big Five personality dimensions. Thereafter, they proceeded to the main part of the study, which consisted of 220 questions divided into five blocks. At the end of each block, the respondents were asked to evaluate their satisfaction with the survey (measured with one item).

We investigated three hypotheses. First, we examined whether choice of reimbursement (feedback vs. coupon) would be related to the probability of dropping out. Thus, whereas prior research had found that both measures were effective at reducing dropout, we were interested in whether people's preference for one of these rewards would be related to dropout. Second, we investigated the relations between the Big Five factors and dropout. On the basis of earlier related research on the determinants of offline and online participation, we expected the strongest relations for Openness, Agreeableness, and Conscientiousness. This also seemed plausible on the basis of the conceptualization of these traits (e.g., McCrae & John, 1992): Quitting a scientific online survey should be less probable for conscientious people who stick to their commitments, for agreeable individuals who like to help others, and for individuals high in Openness who are interested in new and unexpected experiences. Finally, we also tested a mediation hypothesis, namely, whether any potential relation between personality and dropout (occurring after a specific question set) would be mediated by differentially triggered cognitive-affective mechanisms (e.g., Hampson, 2012), in our case the participants' actual satisfaction with this question set. This mediation hypothesis was based on the assumption that if people quit a task that they had voluntarily begun, they should do so due to a negative evaluation or because negative affect is associated with the ongoing task or contents (Rogelberg, Spitzmueller, Little, & Reeve, 2006). Thus, if personality is related to dropout, this effect should emerge through the effect of personality on perceptions and feelings associated with the actual question set. One feeling that is prevalent when individuals complete a questionnaire set is the satisfaction or positivity that they associate with it.

## Method

### Participants

At the beginning of the study, there were  $N = 3,013$  participants. Due to the fact that we asked for demographic information in the second block of the questionnaire (see Table 1), information about the gender and age of participants was available for only part of the sample ( $N = 2,479$ ). Of these, 71.6% were women, and the mean age was 23.4 years ( $SD = 3.9$ ).

Table 1.

*Overview of Measures and the Numbers of Items Assessed in the Eight Question Sets*

Question set	Time-interval	Measures	No. of items
1	[0, 1)	Motivation to participate in online surveys	35
2	[1, 2)	Experience with online surveys, demographics	36
3	[2, 3)	NPI, Dirty Dozen	52
4	[3, 4)	SRP-III, Mach-IV	51
5	[4, 5)	NARQ, MSWS	50

*Note.* NPI = Narcissistic Personality Inventory (Raskin & Hall, 1979), Dirty Dozen = Dark Triad measure (Jonason & Webster, 2010), SRP-III = Self-Report Psychopathy Scale-III (Hare, 1985), Mach-IV = Inventory for the measurement of Machiavellianism (Christie & Geis, 1970), NARQ = Narcissistic Admiration and Rivalry Questionnaire (Back, Küfner, Dufner, Gerlach, Rauthmann, & Denissen, 2013), MSWS = Multidimensional Self-Esteem Scale (Schütz & Sellin, 2006).

### Procedure

The study was conducted in Germany, and all study materials were presented in German. Participants were recruited via a university-wide email list. The study website (see <https://osf.io/yph2g/> for an offline version of the online study) explained that we were interested in why individuals are motivated to participate in online studies. On the next page, participants were asked to indicate whether they wanted to (a) receive feedback about their personality traits at the end of the study (personality feedback; coded 0) or (b) take part in a lottery in which 30 Amazon coupons with a value of 10 Euro each would be drawn (coupon; coded 1). No information on how to access the coupon or the feedback was given at this point. To take part in the lottery for the coupon, participants were later asked to provide their e-mail address with the assurance that we would not share it and that all addresses would be deleted after the coupons were drawn. Participants in the personality feedback condition received feedback about their scores on the Big Five personality dimensions. Specifically, they were informed about whether they had a below-average, an average, or an above-average score. Please note when participants indicated their reimbursement choice, they were not informed about which personality traits they would be given feedback on.

After indicating their reimbursement choice, all participants were asked to fill out the BFI-S (a short scale to assess the Big Five personality dimensions, see below) and afterwards they rated, for the first time, their satisfaction with the questionnaire. They were then asked to fill out five question sets one after another. An overview of the measures assessed in each question set and the overall number of items is presented in Table 1. Each set comprised 35 to 50 items with more items in the later question sets. In addition to answering the items, participants were asked at the end of each question set to indicate their satisfaction with the questionnaire. The two choice-of-reimbursement groups received the same BFI-S instructions, the same question sets, and the same satisfaction items. After participants completed the fifth question set, they either received information concerning their scores on the Big Five personality dimensions or they were asked to provide their e-mail address for the lottery of the coupons. Thereafter, another Big Five questionnaire was presented (containing the NEO-PI-R).<sup>1</sup> Altogether, completing the questionnaire took a rather long time; the mean time to complete the whole survey was 63.0 min ( $SD = 21.4$ ).

<sup>1</sup> The administration of the NEO-PI-R was split into three additional question sets. As these question sets (a) were repetitive in terms of item content (another Big Five questionnaire), (b) directly followed the personality feedback or entering the e-mail address for participating in the lottery, and (c) were considerably longer than the previous question sets, a number of additional and potentially confounding psychological processes might have influenced dropout in these question sets in comparison to the first five question sets. Therefore, we decided to not include these question sets into our analyses. Nevertheless, when including these question sets, results were very similar (see <https://osf.io/yph2g/> for the raw data of all eight question sets as well as the Mplus code to analyze this data).

### *Measures Used in the Analyses*

To examine the influence of the Big Five personality dimensions on dropout, we asked participants to fill out the BFI-S (Hahn, Gottschling, & Spinath, 2012). The BFI-S is a 15-item personality scale that measures an individual's levels of Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness with three items each. Each item had to be answered on a 5-point rating scale ranging from 1 (*completely disagree*) to 5 (*completely agree*). The structural, convergent, and discriminant validity of the BFI-S has been demonstrated for online samples (see Hahn et al., 2012). Satisfaction with the questions contained in a question set was after each question set with a single item ("How satisfied are you so far with the questionnaire?"). The item had to be answered on a scale ranging from 1 (*very unsatisfied*) to 6 (*very satisfied*).

### *Measures That Were Part of the Question Sets*

Participants were asked to fill out 35 items that were related to their motivation to participate in online studies. An additional 36 items assessed their experiences with and attitudes toward online studies. The NPI (Narcissistic Personality Inventory; Raskin & Hall, 1979) is a 40-item scale that assesses an individual's level of Narcissism. The NARQ (Narcissistic Admiration and Rivalry Questionnaire; Back, Küfner, Dufner, Gerlach, Rauthmann, & Denissen, 2013) also measures Narcissism; the scale contains 18 items. The Mach-IV is a 20-item instrument for the measurement of Machiavellianism (Christie & Geis, 1970); the SRP-III (Self-Report Psychopathy Scale-III; Hare, 1985) is a 31-item questionnaire that assesses Psychopathy; and the Dirty Dozen (Jonason & Webster, 2010; Küfner, Dufner, & Back, 2015) is a 12-item measure of Narcissism, Psychopathy, and Machiavellianism. Participants also completed a 32-item questionnaire concerning Self-Esteem (i.e., Multidimensional Self-Esteem Scale; Schütz & Sellin, 2006). Finally, the NEO-PI-R (NEO-Personality Inventory; Ostendorf & Angleitner, 2004) consists of 240 items and also measures a person's scores on the Big Five personality dimensions.

### *Statistical Analyses*

Question sets were used to define five time intervals. For each time interval, a binary indicator was constructed to reflect whether a participant continued or quit the online survey. In the former case, the indicator was scored 0 (i.e., no event), and in the latter case, the event was scored 1. These indicators were used to conduct discrete-time survival analyses (DTSA).

In DTSA, the set of binary indicators is used to fit a hazard function. The hazard denotes the conditional probability that a participant will quit the online survey during a specific question set given that s/he did not quit the survey during an earlier one. The hazard function can be used to compute the survival function reflecting the probability of not quitting the survey. The effect of covariates on hazard or survival probabilities, respectively, can also be modeled. Here, we tested whether choice of reimbursement, individual differences on the Big Five personality dimensions, and satisfaction with the questionnaire in the prior time interval had effects on the probability of quitting the questionnaire.

A standard assumption in DTSA is that a covariate (e.g., reimbursement choice) has the same effect in every time period (in our case, in every question set; Singer & Willett, 1993, 2003; Nestler, Grimm, & Schönbrodt, 2015). With respect to a graphical representation of the survival function, this means that the shape of the survival function is similar for each predictor value (e.g., is similar in the personality feedback and in the coupon condition), but that the level is different (e.g., the survival function is consistently higher in the personality feedback condition). However, this proportionality assumption might not be met in practice and therefore should be explored prior to the analyses.

Muthén and Masyn (2005) showed that conventional DTSA corresponds to a single-class latent class analysis with binary time-specific event indicators (see Kaplan, 2004, for an introduction to latent class analysis). Following their approach, we first fit an unconditional survival model that included the five binary time-event-specific indicators only. The results of the model were used to compute hazard probabilities and survival probabilities. Two conditional survival models were then computed for each of the covariates: For the first model, the influence of the covariate was assumed to be identical in every question set (i.e., the proportionality assumption was assumed to hold). This assumption was relaxed in the second model. The two models were then compared using a Likelihood ratio test, and the results of the better fitting model are reported. Please note that a file with the raw data as well as the Mplus codes that we used to estimate the survival models can be downloaded from the Open Science Framework: <https://osf.io/yph2g/>.

**Results**

Table 2 reports the means, standard deviations, and correlations between the main measures used in this study. Furthermore, the table includes the reliabilities (Cronbach’s  $\alpha$ ) of the BFI-S subscales.<sup>2</sup> The analyses showed that about 52% of the initial sample decided to receive personality feedback. Furthermore, we found that no significant difference emerged between the two reimbursement conditions for the Big Five personality factors, Neuroticism:  $t(3011) = 0.862, p = .389$ , Extraversion:  $t(3011) = -0.210, p = .834$ , Openness:  $t(3011) = 0.747, p = .455$ , Agreeableness:  $t(3011) = 0.258, p = .797$ , Conscientiousness:  $t(3011) = -0.834, p = .404$ . We also tested whether the two conditions differed in gender (feedback: 73.7% women, coupon: 72.9% women), and age (coupon:  $M = 23.91, SD = 3.82$ , feedback:  $M = 23.79, SD = 4.07$ ); no significant differences emerged here, however, gender:  $\chi^2 = 0.159, p = .690$ ; age:  $t(2181) = 0.701, p = .483$ . Concerning dropout, finally, the correlations in Table 2 show that only reimbursement choice, Openness, Agreeableness, and Conscientiousness were related to some of the five binary indicators that coded dropout after a question set.

Table 2  
Means, Standard Deviations, and Correlations between the Main Measures Used in the Study

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<i>M</i>	0.48	3.61	4.97	4.95	5.43	5.41	4.44	4.05	4.13	4.16	3.98	.18	.12	.06	.08	.05
<i>SD</i>	.50	1.35	1.23	1.14	.95	.89	.93	.96	.92	1.02	1.09	.38	.32	.24	.27	.22
1. RC	-															
2. N	-.02	.76														
3. E	.00	<b>-.13</b>	.77													
4. O	-.01	<b>-.10</b>	<b>.26</b>	.65												
5. A	-.01	<b>-.12</b>	<b>.20</b>	<b>.21</b>	.66											
6. C	.02	<b>-.11</b>	<b>.17</b>	<b>.16</b>	<b>.29</b>	.61										
7. SAT 1	-.01	<b>-.05</b>	<b>.08</b>	<b>.08</b>	<b>.14</b>	<b>.13</b>	-									
8. SAT 2	-.03	<b>-.07</b>	<b>.06</b>	<b>.08</b>	<b>.12</b>	<b>.13</b>	<b>.49</b>	-								
9. SAT 3	<b>-.07</b>	<b>-.08</b>	<b>.06</b>	<b>.07</b>	<b>.13</b>	<b>.13</b>	<b>.44</b>	<b>.73</b>	-							
10. SAT 4	<b>-.14</b>	<b>-.07</b>	<b>.08</b>	<b>.08</b>	<b>.11</b>	<b>.08</b>	<b>.38</b>	<b>.55</b>	<b>.66</b>	-						
11. SAT 5	<b>-.19</b>	<b>-.05</b>	.04	<b>.08</b>	<b>.10</b>	.04	<b>.31</b>	<b>.47</b>	<b>.57</b>	<b>.75</b>	-					
12. DO 1	<b>.06</b>	.02	-.03	<b>-.08</b>	<b>-.10</b>	<b>-.06</b>	<b>-.14</b>					-				
13. DO 2	<b>.07</b>	-.01	.02	<b>-.04</b>	-.04	<b>-.04</b>	<b>-.09</b>	<b>-.15</b>					-			
14. DO 3	<b>.07</b>	-.02	.01	<b>-.06</b>	-.03	-.00	<b>-.09</b>	<b>-.13</b>	<b>-.18</b>					-		
15. DO 4	<b>.08</b>	-.01	-.01	-.04	-.02	-.02	-.02	<b>-.10</b>	<b>-.13</b>	<b>-.19</b>					-	
16. DO 5	<b>.06</b>	-.00	.02	-.01	-.01	.00	.01	-.01	-.04	<b>-.11</b>	<b>-.17</b>					-

Note. Sample sizes differed according to the number of participants who decided to quit the study. Significant correlations at  $p < .05$  are presented in bold. The diagonal elements for N = Neuroticism, E = Extraversion, O = Openness, A = Agreeableness, and C = Conscientiousness denote the reliabilities of the personality measures. RC = Reimbursement choice, SAT 1 = Satisfaction with question set 1, SAT 2 = Satisfaction with question set 2, SAT 3 = Satisfaction with question set 3, SAT 4 = Satisfaction with question set 4, SAT 5 = Satisfaction with question set 5, DO 1 = dropout question set 1, DO 2 = dropout question set 2, DO 3 = dropout question set 3, DO 4 = dropout question set 4, and DO 5 = dropout question set 5. DO 1 to DO 5 are the binary indicators that coded whether a participants decided to quit the study after the first to the fifth question set (0 = continuing the survey, 1 = quitting the survey).

*The Unconditional Model*

For a more stringent test of this observation, we first computed an unconditional model in which the five binary indicators were used to predict event occurrence. Parameter estimates were used to compute hazard probabilities and survival probabilities. Results are shown in Table 3 together with the actual number of participants who began answering a specific question set and the number of participants who quit before they finished answering the specific question set. Overall, dropout was most likely to occur during the first two question sets. Note that

<sup>2</sup> With respect to the BFI-S subscales, test-retest reliabilities are more adequate measures of their reliabilities than internal consistencies because the three items represent different aspects of each of the broad Big Five personality dimensions (cf. Gosling, Rentfrow, & Swann, 2003; Rammstedt & John, 2007). In Hahn et al. (2012), the stability coefficient measured as the test-retest interval over 18 months was .74 for Neuroticism, .80 for Extraversion, .72 for Openness, .57 for Agreeableness, and .67 for Conscientiousness.

the fifth binary indicator codes whether participants have completed the fifth question set and all other question sets before. This variable thus captures whether a participant has or has not completed the entire survey until receiving personality feedback or providing their email-address to receive the coupon.

Table 3

*Life Table of the Number of Participants who Began the Question Set, Number of Participants who Left During the Question Set, Proportion of Participants who Left by the End of the Interval (Hazard Probability) and who did not Leave (Survival Probability)*

Set	Interval	Number of participants who began the set	Number of participants who left the set	Baseline model		Hazard probabilities	Survival probabilities
				Estimate	SE		
Start		3013	-			-	1.00
1	[0, 1)	3013	538	-1.53*	0.05	.18	.82
2	[1, 2)	2475	293	-2.01*	0.06	.12	.72
3	[2, 3)	2182	131	-2.75*	0.09	.06	.68
4	[3, 4)	2051	161	-2.46*	0.08	.08	.63
5	[4, 5)	1890	96	-2.93*	0.11	.05	.59

\*  $p < .05$ .

#### Conditional Models

We then examined whether the Big Five factors and choice of reimbursement had an effect on survival curves. As stated above, this was done in two ways: First, we estimated a DTSA model in which the effect of the covariate was restricted to equality across question sets; in the second model, this restriction was not made. Results showed that the effect of satisfaction with the survey varied with time ( $\Delta\chi^2 = 17.82$ ,  $df = 7$ ,  $p = .013$ ), but not the influence of choice of reimbursement ( $\Delta\chi^2 = 3.75$ ,  $df = 7$ ,  $p = .81$ ), and the effect of the Big Five personality dimensions (Neuroticism:  $\Delta\chi^2 = 2.27$ ,  $df = 7$ ,  $p = .94$ ; Extraversion:  $\Delta\chi^2 = 6.09$ ,  $df = 7$ ,  $p = .53$ ; Openness:  $\Delta\chi^2 = 2.03$ ,  $df = 7$ ,  $p = .96$ ; Agreeableness:  $\Delta\chi^2 = 5.36$ ,  $df = 7$ ,  $p = .62$ ; Conscientiousness:  $\Delta\chi^2 = 3.52$ ,  $df = 7$ ,  $p = .83$ ). Therefore, the effects of choice of reimbursement and the Big Five personality factors were estimated to be constant across time and the effect of satisfaction to be nonproportional across time.

We found<sup>3</sup> that the decision to receive personality feedback increased participants' probability of *not* quitting the questionnaire ( $b = 0.44$ ,  $z = 7.08$ ,  $p < .01$ , odds ratio = 1.55; also see Figure 1, Panel A). Furthermore, Openness ( $b = -0.15$ ,  $z = -5.67$ ,  $p < .01$ , odds ratio = 0.86), Agreeableness ( $b = -0.17$ ,  $z = -5.27$ ,  $p < .01$ , odds ratio = 0.84), and Conscientiousness ( $b = -0.12$ ,  $z = -3.39$ ,  $p < .01$ , odds ratio = 0.88) had significant influences on survival curves: People with higher values on these variables had a higher probability of continuing to answer the question sets (see Figure 1, Panels B, C, and D). The other two traits did not affect the survival probability profiles, Neuroticism ( $b = 0.00$ ,  $z = -0.01$ ,  $p = .99$ ) and Extraversion ( $b = -0.06$ ,  $z = -0.26$ ,  $p = .79$ ). Regarding satisfaction with the online survey, we found that for all question sets, the odds of quitting the questionnaire were about 50% higher when there was a previous decrease in questionnaire satisfaction (set 1:  $b = -0.37$ ,  $z = -7.58$ ,  $p < .01$ , odds ratio = 0.69; set 2:  $b = -0.44$ ,  $z = -7.28$ ,  $p < .01$ , odds ratio = 0.64; set 3:  $b = -0.70$ ,  $z = -8.18$ ,  $p < .01$ , odds ratio = 0.49; set 4:  $b = -0.60$ ,  $z = -7.98$ ,  $p < .01$ , odds ratio = 0.55; set 5:  $b = -0.62$ ,  $z = -6.81$ ,  $p < .01$ , odds ratio = 0.54).

#### Mediation Analyses

Finally, we determined whether the relation of Conscientiousness, Openness, Conscientiousness, and choice of reimbursement across question sets with quitting an online questionnaire was mediated<sup>4</sup> by participants'

<sup>3</sup> We also computed a model that included all predictor variables. The results for this model showed that reimbursement decision ( $b = .44$ ,  $z = 7.04$ ,  $p < .01$ ), Openness ( $b = -.14$ ,  $z = -4.94$ ,  $p < .01$ ), Agreeableness ( $b = -.14$ ,  $z = -4.09$ ,  $p < .01$ ), and Conscientiousness ( $b = -.07$ ,  $z = -1.90$ ,  $p = .057$ ), were significant or marginally significant predictors of dropout even when the other Big Five personality traits were controlled for.

<sup>4</sup> A reviewer suggested that satisfaction with the question set might not only mediate the effect of personality on dropout, but that it might also function as a moderator of this relation. Supplementary analyses showed, however, that of the 25 possible Personality x Satisfaction interactions (5 question sets x 5 personality predictors), only one approached significance. This is

satisfaction with the previous question set. To this end, we regressed participants' satisfaction with the previous question set on their choice of reimbursement, Openness, Agreeableness or Conscientiousness for each of the question sets (the resulting path coefficients correspond to Path a in a standard mediation analysis). In the same model, satisfaction ratings were used to predict whether participants quit the questionnaire while answering a respective question set (these coefficients correspond to Path b). Also, choice of reimbursement, Openness, Agreeableness or Conscientiousness was used as a predictor for quitting the study after the question set (the c' paths). The resulting coefficients for the a-path and the b-path were then multiplied to get an estimate of the respective indirect effect (i.e., we used the product of coefficient approach). Finally, we used the Sobel-Test to test whether the indirect effect significantly differs from zero (see MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002, for an introduction).

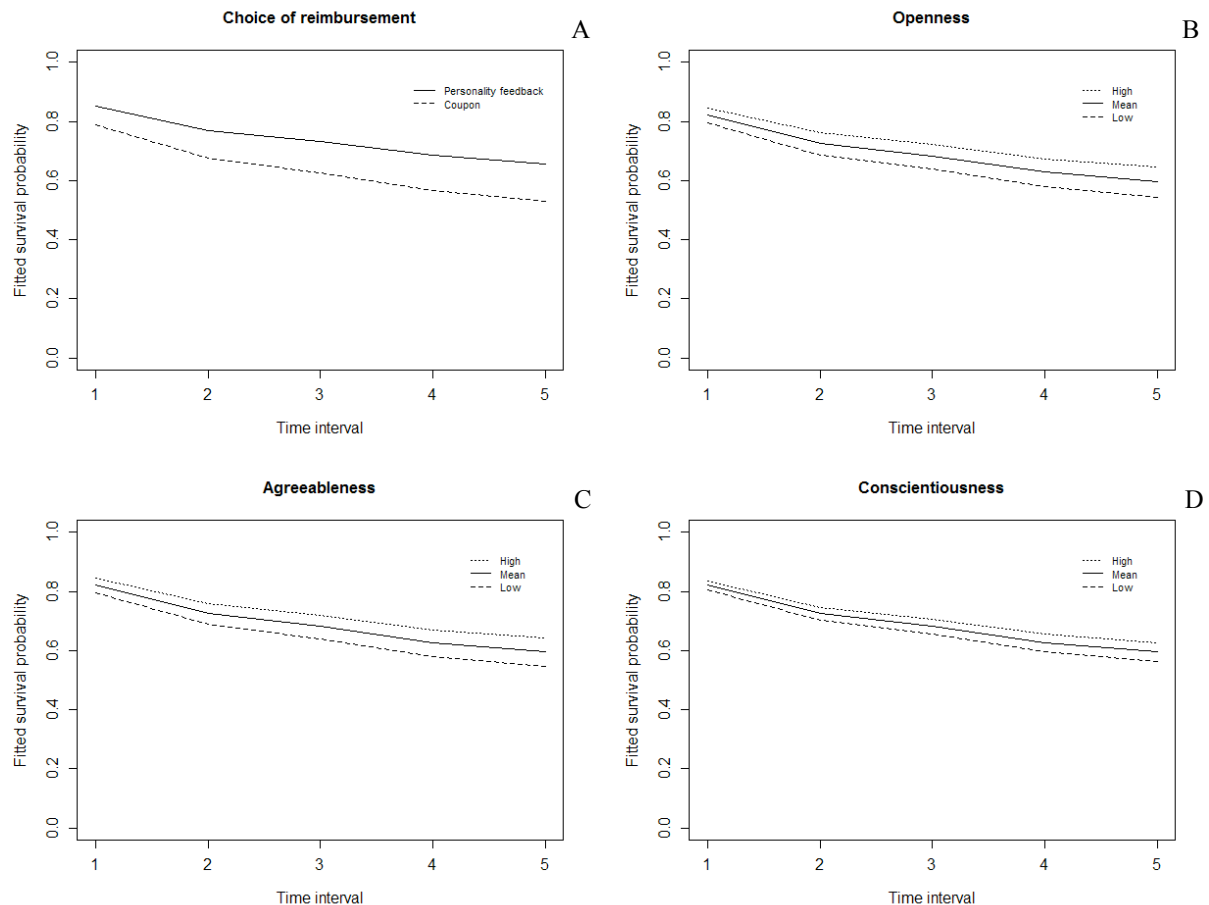


Figure 1. Survival probability functions for choice of reimbursement (Panel A), people with a high, an average, and a low level of Openness (Panel B), Agreeableness (Panel C), and Conscientiousness (Panel D).

Results of these analyses showed that satisfaction partially mediated the effects of Openness on ending participation for all five question sets (indirect effect set 1  $IE_1 = -0.02, z = -3.53, p < .01$ ;  $IE_2 = -0.07, z = -4.45, p < .01$ ;  $IE_3 = -0.12, z = -4.52, p < .01$ ,  $IE_4 = -0.13, z = -4.94, p < .01$ ,  $IE_5 = -0.13, z = -4.76, p < .01$ ). Similar results emerged for Agreeableness ( $IE_1 = -0.05, z = -4.82, p < .01$ ;  $IE_2 = -0.11, z = -5.05, p < .01$ ;  $IE_3 = -0.19, z = -5.35, p < .01$ ,  $IE_4 = -0.16, z = -5.26, p < .01$ ,  $IE_5 = -0.16, z = -4.71, p < .01$ ) and Conscientiousness ( $IE_1 = -0.04, z = -4.76, p < .01$ ;  $IE_2 = -0.09, z = -4.46, p < .01$ ;  $IE_3 = -0.16, z = -4.66, p < .01$ ,  $IE_4 = -0.11, z = -3.85, p < .01$ ,  $IE_5 = -0.10, z = -3.37, p < .01$ ). For choice of reimbursement significant indirect effects were found for the second to the fifth question set ( $IE_2 = 0.11, z = 3.32, p < .01$ ;  $IE_3 = 0.28, z = 4.59, p < .01$ ;  $IE_4 = 0.35, z = 5.49, p < .01$ ;  $IE_5 = 0.43, z = 5.49, p < .01$ ) but not for the first question set ( $IE_1 = 0.01, z = 0.65, p = .52$ ). These results were corroborated by the fact that the average mediated effects across the five question sets was significant for all four variables (choice of reimbursement:  $0.24, z = 6.64, p < .01$ ; Openness:  $-0.10, z = -6.16, p < .01$ ; Agreeableness:  $-0.13, z = -6.98, p < .01$ ; Conscientiousness:  $-0.10, z = -5.29, p < .01$ ).

considerably lower than one can expect from chance, and hence, we believe that interaction effects did not play a strong role in our study.



## **Discussion**

We asked participants to rate a number of items that were divided into separate question sets. DTSA was used to analyze the effect of personality and choice of reimbursement on whether the participant quit the questionnaire. Results showed, first, that for individuals who decided to receive personality feedback, the chances were about 50% higher that they would not quit the online survey compared with individuals who chose to participate in a lottery for a coupon. Second, individuals scoring high on Openness, Agreeableness, and Conscientiousness had a higher probability of continuing to answer the question set. Neuroticism and Extraversion had no effect on survival probabilities. Finally, we showed that the effects of all reimbursement choice, Openness, Agreeableness, and Conscientiousness were mediated by actual satisfaction with the web survey: Higher values on one of the variables led to higher satisfaction ratings, which in turn led to a higher probability to continue with the questionnaire.

These findings were in line with our hypotheses. Hence, they provide further evidence for the notion that personality has profound effects on behaviors relevant to experimenting (e.g., Aviv et al., 2002). Conscientiousness is related to a generally higher commitment to mutual agreements and this seems to enhance the chances to go on filling out an online survey once started. Openness relates to a higher interest in novel experiences including unusual ones and this tendency seems to keep open individuals being interested in online surveys for a longer time. Finally, Agreeableness is generally related to prosocial attitudes and behaviors. Here, we found that this tendency translated into a smaller probability of quitting online surveys which might be interpreted as a smaller willingness to react antisocial without sufficient justification to do so.

Altogether, these effects are important as they may lead to under- or overestimation of content-related associations. For example, if two variables are more strongly correlated in a subgroup of individuals who “survived” the online survey due to their personality, this confound may cause an overestimation of the association. Systematic dropout based on personality differences, by contrast, may also lead to an underestimation of the true association when one of the variables has low variability (i.e., range restriction).

To overcome these potential confounds, one may randomize the presentation of the questions within a survey. Also, relevant personality traits should be assessed in addition to the variables that one is interested in. These could be used to check whether a range restriction is present for this variable. For operators of volunteer online panels, our results imply that they may want to use short inventories (similar to the BFI-S that we used here) to screen the personalities of their volunteers to establish a representative panel. At the very least, they should assess such data to better understand (all forms of) dropout. Finally, our results highlight the importance of personality feedback by showing the beneficial effects of such feedback on decreasing dropout (also see Bälter, Fondell, & Bälter, 2012). From a practical point of view, this suggests that web questionnaires should offer respondents personality feedback that is intrinsically interesting in addition to the standard feedback and debriefing. Furthermore, future research should explore how the design of such feedback can be improved in order to lower dropout rates even further.

### *Limitations and Future Research*

The present findings support the contention that personality and choice of reimbursement are related to dropout. However, a number of limitations of the present study should be acknowledged. The response behavior that we examined (i.e., dropout) and the factors that we expected to affect this behavior (i.e., the personality traits and the choice of reimbursement) were assessed in the same setting. In future studies, a separate assessment of the expected factors of influence and the predicted behavior would be preferable. Second, we used a nonrepresentative student sample containing mostly women. Hence, we cannot, for example, be sure if any of the effects found in this study depend on the gender of the participants. A third limitation of the present findings is that we did not experimentally manipulate the choice of reimbursement. The effect of this variable may hence be due to confounds that are related to the participants’ decisions. Although participants in the two decision conditions did not differ on the demographic variables and on the personality variables, we believe that a more stringent test of the influence of the choice of reimbursement is important. Fourth, we did not present the questionnaire blocks in a random order. Hence, we cannot be sure whether participants prematurely quit the study because of the length of the survey or because of the survey’s content. Although the focus of the present work was on whether personality is related to dropout at all, this differentiation might be important as some personality dimensions might be related to dropout because they correspond with the content of the questions (e.g., content involving Neuroticism and Anxiety) and hence their influence may be underestimated when only the survey’s length is considered. We believe that examining these differential effects is an important avenue for future research. Related to this point, a fifth limitation is that the lengths of our item blocks varied. Hence, future studies should apply item blocks of equal length throughout the survey. Sixth, we assessed participants’ satisfaction with the questions using a very broad single-item approach. Future studies should more

comprehensively measure participants' reactions to a survey's questions, including different facets such as boredom due to the questions, redundancy in the questions, and so on. This should allow for a more exact test of which specific psychological reactions mediate the relation between personality and dropout. Seventh, given the reliability of the Openness, Agreeableness and Conscientiousness measures, we think that results concerning these three personality dimensions should be regarded as tentative and that future research should replicate the respective findings using more reliable measures. Finally, as the current study investigated only answering dropouts (cf. Bosnjak, 2001), future research should apply the present design to investigate the influence of personality on lurking, unit nonresponding, and item nonresponding.

To summarize, we found that choice of reimbursement, Openness, Agreeableness, and Conscientiousness were systematically related to dropout in an online survey and that these associations were mediated by satisfaction with the questionnaire in the previous question block. These findings underline the double-sided nature of personality effects in psychological research: Personality is often not only meaningfully related to the content of the variables that are being assessed but is also related to participation in the study itself.

### Acknowledgements

We would like to thank Ulf-Dietrich Reips and the two anonymous reviewers for their valuable comments on earlier drafts of this paper.

### References

- Aviv, A. L., Zelenski, J. M., Rallo, L., & Larsen, R. J. (2002). Who comes when: personality differences in early and later participation in a university subject pool. *Personality and Individual Differences*, *33*, 487-496.
- Back, M. D., Küfner, A. C. P., Dufner, M., Gerlach, T. M., Rauthmann, J. F., & Denissen, J. J. A. (2013). Narcissistic admiration and rivalry: Disentangling the bright and dark sides of narcissism. *Journal of Personality and Social Psychology*, *105*, 1013-1037.
- Back, M. D., Schmukle, S. C., & Egloff, B. (2006). Who is late and who is early? Big Five personality factors and punctuality in attending psychological experiments. *Journal of Research in Personality*, *40*, 841-848.
- Back, M. D., Schmukle, S. C. & Egloff, B. (2009). Predicting actual behavior from the explicit and implicit self-concept of personality. *Journal of Personality and Social Psychology*, *97*, 533-548.
- Bälter, O., Fondell, E., & Bälter, K. (2012). Feedback in web-based questionnaires as incentive to increase compliance in studies on lifestyle factors. *Public Health Nutrition*, *15*, 982-988.
- Birnbaum, M. H. (2004). Human research and data collection via the Internet. *Annual Review of Psychology*, *55*, 803-832.
- Bosnjak, M. (2001). Classifying response behaviors in web-based surveys. *Journal of Computer-Mediated Communication*, *6*, 1-14.
- Brüggen, E., & Dholakia, U. M. (2010). Determinants of participation and response effort in web panel surveys. *Journal of Interactive Marketing*, *24*, 239-250.
- Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science*, *6*, 3–5.
- Christie, R., & Geis, F. L. (1970). *Studies in Machiavellianism*. New York: Academic Press.
- Cronk, B. C., & West, J. L. (2002). Personality research on the Internet: A comparison of web-based and traditional instruments in take-home and in-class settings. *Behavior Research Methods, Instruments, & Computers*, *34*, 177-80.
- Dillman, D., Reips, U.-D., & Matzat, U. (2010). Advice in surveying the general public over the Internet. *International Journal of Internet Science*, *5*, 1–4.

- Fan, W., & Yan, Z. (2010). Factors affecting response rates of the web survey: A systematic review. *Computers in Human Behavior*, 26, 132-139.
- Frick, A., Bächtiger, M. T., & Reips, U.-D. (2001). Financial incentives, personal information and drop-out in online studies. In U.-D. Reips & M. Bosnjak (Eds.), *Dimensions of Internet science* (pp. 209-219). Lengerich: Pabst.
- Frick, A., Neuhaus, C., & Buchanan, T. (2004). *Quitting online studies: Effects of design elements and personality on dropout and nonresponse*. Poster presented at the German Online Research Conference (GOR) 2004, Duisburg, Germany.
- Funder, D. C. (2001). Personality. *Annual Review of Psychology*, 52, 197–221.
- Göritz, A. (2006). Incentives in web studies: Methodological issues and a review. *International Journal of Internet Science*, 1, 58-70.
- Göritz, A., & Crutzen, R. (2011). Reminders in web-based data collection: Increasing response at the price of retention? *American Journal of Evaluation*, 33, 240-250.
- Göritz, A., & Wolff, H. (2007). Lotteries as incentives in longitudinal web studies. *Social Science Computer Review*, 25, 99–110.
- Hahn, E., Gottschling, J., & Spinath, F. M. (2012). Short measurements of personality: Validity and reliability of the GSOEP Big five inventory (BFI-S). *Journal of Research in Personality*, 46, 355-359.
- Hampson, S. E. (2012). Personality processes: Mechanisms by which personality traits “get outside the skin”. *Annual Review of Psychology*, 63, 315-339.
- Hare, R. D. (1985). Comparison of procedures for the assessment of psychopathy. *Journal of Consulting and Clinical Psychology*, 53, 7-16.
- Hoerger, M. (2010). Participant dropout as a function of survey length in internet-mediated university studies: Implications for study design and voluntary participation in psychological research. *Cyberpsychology Behavior and Social Networking*, 13, 697-700.
- ITU (2012). *Measuring the Information Society* (Tech. Rep.). Geneva: International Telecommunication Union. Available at <http://www.itu.int/ITU-D/ict/publications/idi/index.html> [16 Sep. 2013].
- Jonason, P. K., & Webster, G. D. (2010). The dirty dozen: A concise measure of the dark triad. *Psychological Assessment*, 22, 420-432.
- Joinson, A. N., & Reips, U.-D. (2007). Personalized salutation, power of sender and response rates to Web-based surveys. *Computers in Human Behavior*, 23, 1372–1383.
- Kaplan, D. (2004). *The SAGE handbook of quantitative methodology in the social sciences*. Newbury Park, CA: SAGE Publications.
- Knapp, F., & Heidingsfelder, M. (2001). Dropout analysis: Effects of research design. In U.-D. Reips & M. Bosnjak (Eds.), *Dimensions of Internet Science* (pp. 221-230). Lengerich: Pabst.
- Kreuter, F., Presser, S., & Tourangeau, R. (2009). Social desirability bias in CATI, IVR, and web surveys. *Public Opinion Quarterly*, 72, 847-865.
- Küfner, A. C. P., Dufner, M., & Back, M. D. (2015). Das Dreckige Dutzend und die Niederträchtigen Neun – Kurzskalen zur Erfassung von Narzissmus, Machiavellismus und Psychopathie [The Dirty Dozen and the Naughty Nine - Short scales for the assessment of Narcissism, Machiavellianism and Psychopathy]. *Diagnostica*, 61, 76-91.
- MacKinnon, D. P., Lockwood, C. M., Hoffmann, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*, 7, 83-104.
- Mangan, M., & Reips, U.-D. (2007). Sleep, sex, and the web: Surveying the difficult-to-reach clinical population suffering from sexomnia. *Behavior Research Methods*, 39, 233–236.

- Marcus, B., & Schütz, A. (2005). Who are the people reluctant to participate in research? *Journal of Personality*, 73, 959-984.
- McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality*, 60, 175–215.
- Muthèn, B. O., & Masyn, K. (2005). Discrete-time mixture analysis. *Journal of Educational and Behavioral Statistics*, 30, 27-58.
- Nestler, S., Grimm, K. J., & Schönbrodt, F. D. (2015). The social consequences and mechanisms of personality: How to analyze longitudinal data from individual, dyadic, round-robin, and network designs. *European Journal of Personality*, 29, 272-295.
- O’Neil, K. M., & Penrod, S. D. (2001). Methodological variables in Web-based research that may affect results: Sample type, monetary incentives, and personal information. *Behavior Research Methods, Instruments & Computers*, 33, 226-233.
- O’Neil, K. M., Penrod, S. D., & Bornstein, B. H. (2003). Web-based research: Methodological variables' effects on dropout and sample characteristics. *Behavior Research Methods, Instruments & Computers*, 35, 217-226.
- Ostendorf, F., & Angleitner, A. (2004). *NEO-PI-R: NEO-Persönlichkeitsinventar nach Costa und McCrae, revidierte Fassung*. Göttingen: Hogrefe.
- Pealer, L. N., Weiler, R. M., Pigg, R. M., Miller, D., & Dorman, S. M. (2001). The feasibility of a web-based surveillance system to collect health risk behavior data from college students. *Health Education & Behavior*, 28, 547-559.
- Porter, S. R., & Whitcomb, M. E. (2005). Non-response in student surveys: The role of demographics and personality. *Research in Higher Education*, 46, 127–152.
- Raskin, R., & Hall, C. S. (1979). A narcissistic personality inventory. *Psychological Reports*, 45, 590.
- Reips, U.-D. (2002a). Standards for internet-based experimenting. *Experimental Psychology*, 49, 243–256.
- Reips, U.-D. (2002b). Internet-based psychological experimenting - Five dos and five don'ts. *Social Science Computer Review*, 20, 241–249.
- Rogelberg, S. G., & Stanton, J. M. (2007). Understanding and dealing with organizational survey nonresponse. *Organizational Research Methods*, 10, 195–209.
- Rogelberg, S. C., Spitzmueller, C., Little, I., & Reeve, C. L. (2006). Understanding response behavior to an online special topics organizational satisfaction survey. *Personnel Psychology*, 59, 903–923.
- Schütz, A., & Sellin, I. (2006). *MSWS: Multidimensionale Selbstwertskala*. Göttingen: Hogrefe.
- Singer, J. D., & Willett, J. B. (1993). It’s about time: Using discrete-time survival analysis to study duration and the timing of events. *Journal of Educational Statistics*, 18, 155-195.
- Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis*. New York: Oxford University Press.
- Skitka, L. J., & Sargis, E. G. (2006). The internet as psychological laboratory. *Annual Review of Psychology*, 57, 529-555.
- Stopfer, J. M., Egloff, B., Nestler, S., & Back, M. D. (2014). Personality expression and impression formation in online social networks: An integrative approach to understanding the processes of accuracy, impression management, and meta-accuracy. *European Journal of Personality*, 28, 73-94.
- Thompson, L. F., & Surface, E. A. (2007). Employee surveys administered online. *Organizational Research Methods*, 10, 241–261.