



## Short Communication

## Factors associated with inattentive responding in online survey research

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## ABSTRACT

We describe a method assessing inattentive responding in internet-based studies and explore factors associated with this problem. We inserted ‘bogus’ items into an online questionnaire completed by 210 participants and looked at associations between items and possible predictors. We found evidence of inattentive responding despite all participants being willing volunteers. Inattentive responding was related to being male and lower scores on conscientiousness, openness to experience and agreeableness. Researchers carrying out internet-based research should use methods, such as inserting ‘bogus’ items, to detect inattentive responders with a view to excluding their data.

## 1. Introduction

Although using the internet to overcome recruitment barriers is common in mental health research, the practice is criticised due to the lack of environmental control compared to face-to-face methods (Roivainen, Veijola, & Miettunen, 2016). Inattentive responding has been identified as a particular problem and is defined as responding without regard to item content (Huang, Bowling, Liu, & Li, 2015). People may randomly choose from all response options on a scale, or employ a non-random pattern (e.g. scoring all items the same).

Estimated rates of inattention have varied widely, from 3% to 46% of respondents due to lack of clarity on how to define and measure it (Meade & Craig, 2012). Inattentive responding constitutes error variance, which attenuates correlations, reduces internal consistency reliability estimates and leads to erroneous factor analytic results. Common recommendations for cleaning problematic responses, such as univariate outlier analysis rest on the assumption that careless or inattentive responses are rare or extreme in magnitude (Meade & Craig, 2012).

Meade and Craig (2012) assessed the utility of different measures and recommended the use of ‘bogus items’, which are improbable statements that only have one correct response. Incorrect answers therefore indicate inattentive responding. Such statements might include, “I drive in reverse on the motorway”. Such items are easy to create and provide an obvious metric for scoring as correct or incorrect. Unlike other approaches that can be cumbersome to implement (e.g. psychometric antonym) or are format-dependent (e.g. long strings), the

bogus item approach is a simple method that can be used across different surveys (Huang, Bowling, Liu, & Li, 2015). Previous work also suggests inattentive responding scores from the bogus item method load onto the same underlying constructs as more complex inconsistency indices, are not confounded with socially desirable responding, yield high internal consistency alphas, are associated with objective criteria of response effort such as total survey time and do not cause negative reactions from participants (Huang, Bowling, Liu, & Li, 2015; Meade & Craig, 2012).

As well as demonstrating the presence of inattentive responding within datasets it is also valuable to investigate factors correlated with the phenomenon to understand who might be particularly vulnerable and to provide construct validity for inattentive responding measures. Previous studies have reported associations between inattentive responding and being male, younger age and lower level of education level (Maniaci & Rogge, 2014; Roivainen, Veijola, & Miettunen, 2016). Previous research has also reported associations between attentive responding and personality traits, including conscientiousness, agreeableness, openness to experience, high extraversion and emotional stability (Bowling et al., 2016; Maniaci & Rogge, 2014).

In terms of theory, conscientious participants may respond carefully as a direct result of their general tendency to be attentive and compliant, whereas agreeable participants may respond carefully as a result of their general tendency to be altruistic. Previously, it has been argued that participants who are open to experience may respond carefully because they are genuinely interested in contributing to understanding in the sense of generating new scientific knowledge or knowledge about

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themselves (Bowling et al., 2016; Maniaci & Rogge, 2014). Bowling et al. (2016) also found negative associations between inattentive responding and both extraversion and high emotional stability (low neuroticism). They argued that high extraversion and high emotional stability may contribute to degree of social competence, which may in turn increase accurate responding. Emotional instability (high neuroticism) may also be a source of distraction from careful responding.

In this study we describe the development and preliminary validation of a brief measure of inattentive responding that can be used to detect problematic responses across questionnaire surveys. In line with previous research, we hypothesise associations between scores on our measure of inattentive responding and being male, younger age, lower levels of education and lower scores on measures personality traits of conscientiousness, agreeableness, openness to experience and extraversion and higher scores on neuroticism.

## 2. Method

### 2.1. Measures

#### 2.1.1. International Personality Item Pool for personality traits

The International Personality Item Pool of personality traits (IPIP-NEO; Goldberg, 1999) has 300 items with a standard five point Likert scale (1 = Very Inaccurate; 5 = Very Accurate). All items were repeated twice to increase the length of the questionnaire, thus maximising opportunities to assess careless responding.

#### 2.1.2. Bogus items

Twenty four items were developed that contained improbable behaviours, such as ‘eating cement’ or ‘driving backwards on the motorway’, all of which only had one plausible answer (Very Inaccurate). We were careful to ensure that such items were unlikely to tap social desirability responding. For example, people may agree with the item: “I am knowledgeable about Vootropology” to appear knowledgeable.

The items were included alongside the IPIP-NEO items and with the same response scale. If participants clicked a response of 1 for an absurd item (meaning that they rated the item as very inaccurate) they were given an attentive item score of 1 and if participants clicked a response of 2, 3, 4, and 5 for an absurd item (meaning that they endorsed the item to some extent) they were given an attentive score of 0. A mean inattentive responding score was calculated for each participant, with lower mean scores indicative of less attentive responding.

#### 2.1.3. Demographics

At the start of the survey, participants were asked to report the following demographic information: age, gender and highest educational achievement.

### 2.2. Participants and procedure

Participants were recruited using opportunity sampling via social media sites and University announcements. An online advert of the study, containing its title and a link to access the online survey, was posted and interested participants clicked the link which led them to a webpage presenting study information. The information did not reveal the true purpose of the study but informed participants that the study was investigating effects of demographics on personality.

The survey was presented as ten IPIP items per page plus one bogus item. It was designed to take no longer than 60 min complete, but participants could leave at any time. Survey completion was terminated after 60 min, even if participants had not completed all items. We included all data irrespective of whether or not participants completed the survey. The bogus item score was a mean score so was calculated on the basis of the number of bogus items completed at the point the participant exited the survey. Where possible we calculated all personality measure subscales scores for participants, but where there were

no items completed for a given subscale this data was treated as missing.

Once they exited the study, participants were emailed a debriefing sheet containing the true purpose of the study and why they were misinformed, as well as a link to opt-out of the study if they no longer wished to contribute their data.

## 3. Results

### 3.1. Sample characteristics

There were 210 participants with a mean age of 29.76 years (SD = 10.69, range = 18–66). Seventy percent of the sample were female and 73% of the sample were university educated. The mean inattentive responding score was 0.80 (SD = 0.25, range = 0–1). Internal consistency of the bogus items was good ( $\alpha = 0.83$ ). We measured the total length of time that participants were logged into the survey and found a positive correlation between duration of survey and inattentive responding, meaning that participants who were in the survey for longer were more careful responders.

### 3.2. Relationship between inattentive responding and demographic variables

Contrary to hypotheses, there were no statistically significant correlations between age and inattentive responding ( $r = 0.04$ ,  $p = 0.560$ ) and no significant group effects for level of education ( $t = -0.19$ ,  $df = 193$ ,  $p = 0.581$ ), comparing those participants with and without a degree level qualification. However, there were significant gender effects ( $t = -2.36$ ,  $df = 90.45$ ,  $p = 0.020$ ), suggesting that women were more attentive responders than men (female mean inattentive score = 0.83, SD = 0.22; male mean inattentive score = 0.73, SD = 0.29; Hedge's  $g = 0.41$ ).

### 3.3. Relationship between inattentive responding and personality traits

As hypothesised, inattentive responding was significantly correlated with conscientiousness ( $r = 0.28$ ,  $p > 0.001$ ), agreeableness ( $r = 0.38$ ,  $p < 0.001$ ) and openness to experience ( $r = 0.23$ ,  $p = 0.001$ ). The direction of effects suggested that those who were more conscientious, agreeable and open to experience were more attentive. There were no significant correlations between inattentive responding and extraversion ( $r = 0.02$ ,  $p = 0.082$ ) and neuroticism ( $r = -0.01$ ,  $p = 0.938$ ).

A multiple regression analysis with gender, agreeableness, conscientiousness and openness as the independent variables significantly predicted inattentive responding scores (Adjusted  $R^2 = 0.21$ ,  $F = 14.61$ ,  $df = 4, 202$ ,  $p < 0.001$ ). As shown in Table 1, agreeableness and conscientiousness were the only significant independent predictors in the model.

## 4. Discussion

Findings suggest that inattentive responding is present even when respondents are willing volunteers and there are no external incentives to participate. Inattentive responding does not appear to be related to age or education, although there is some evidence that men may be

**Table 1**  
Regression model predicting inattentive responding scores.

	Beta	t	p value
Gender	0.045	0.693	0.489
Agreeableness	0.360	4.937	< 0.001
Conscientiousness	0.151	2.272	0.024
Openness	0.052	0.747	0.456

more vulnerable than women. Those who score lower on personality traits for agreeableness, conscientiousness and agreeableness may also be more vulnerable.

Findings of high internal consistency estimates for the bogus items suggest that some respondents were consistently inattentive whereas others responded carefully. We found that individuals who were in the survey for longer were less likely to respond carelessly. Whilst, this finding might seem counterintuitive, it may reflect the fact that careful responders are also more diligent and complete the task they signed up for. It is, nonetheless plausible that respondents' attention may vary throughout the survey which we were not able to capture in this data set. Future studies should include more fine-grained response time analysis across sections of the survey to detect variations in inattentive responding over time. In terms of response times, it would also be interesting to explore if there are response time differences for 'straight' and 'bogus' items.

Our null findings for age and education level are in contrast to previous research (Maniaci & Rogge, 2014; Roivainen, Veijola, & Miettunen, 2016) and highlight that the problem of inattentive responding may arise in different age and educational groups. However, it might also be an artefact of the relatively homogeneity of our sample in terms of age and education. Data sets that include a wide range of age groups and levels of education may be more likely to find significant effects.

The finding that men are more vulnerable to inattentive responding than women is consistent with previous studies and may reflect the fact that women are more likely to demonstrate personality traits that increase the risk of inattentive responding. The fact that gender was no longer a significant predictor of inattentive responding when personality variables were controlled supports this hypothesis. Within this dataset, females were more likely to score higher on openness and agreeableness compared to males (see supplementary data). The relatively higher proportion of women than men who participated in the survey is also noteworthy and suggests that findings may be less likely to generalise to males.

Findings of associations between inattentive responding and personality traits of agreeableness, conscientiousness and openness are also consistent with previous research (Maniaci & Rogge, 2014). Our regression findings suggest that the effects of agreeableness and conscientiousness may be particularly important in determining how attentively participants respond. These characteristics are most logically related to careful responding from a theoretical perspective and are the most consistent predictors across previous studies (Bowling et al., 2016; Maniaci & Rogge, 2014).

It is important to note that this study used non-sensitive items to test inattentive responding. Previous research has shown that respondents' answers differ when asked to respond to sensitive topics, such as abortion and domestic violence (Meade & Craig, 2012). Studies comparing answers to sensitive and non-sensitive topics could be conducted using the bogus items to see if topic of the study affects inattentive effort differently. It is also possible that inattentive responding and study drop out were inflated by the fact that the study solely focused on personality trait items. Future studies should determine the degree to which survey items themselves influence inattentive responding scores.

Future studies should examine a broad set of individual differences (e.g. personal relevance of the study, attention capacity) and methodological factors (e.g. inclusion criteria, study format, study length,

incentives, item redundancy, recruitment sources) to more fully characterise the correlates of inattentive responding. Future studies should also determine criteria for removing inattentive responders, as previous research suggests that removing such participants results in gains in statistical power due to reductions in error variance, despite reduced sample size (Maniaci & Rogge, 2014). It could even be argued that the inclusion of careless responders in this study introduced error into our data and influenced the validity of the conclusions. Similarly, we included multiple personality measure items which could have artificially increased the probability of careless responding. Whilst we recommend that researchers remove responses from careless responders, doing so in this instance, when we are trying to predict careless responding, would have served to remove variance from the data that we were attempting to explain. We claim confidence in the validity of our findings on the basis that rates of careless responding were relatively low and the fact that our findings are consistent with previous research.

Undoubtedly, internet-based data collection will continue to be a dominant data collection paradigm in mental health research. Our findings suggest that it is essential that data be properly screened for careless responses in order to safeguard the integrity of research conclusions.

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#### Ethics statement

The study was approved by the University of Manchester Ethics Committee (Ref: ethics/16085).

#### Declaration of Competing Interest

None.

#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2019.05.043>.

#### References

- Bowling, N. A., Huang, J. L., Bragg, C. B., Khazon, S., Liu, M., & Blackmore, C. E. (2016). Who cares and who is careless? Insufficient effort responding as a reflection of respondent personality. *Journal of Personality and Social Psychology*, *111*(2), 218–229.
- Goldberg, L. R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Vol. Eds.), *Personality Psychology in Europe. 7. Personality Psychology in Europe* (pp. 7–28). Tilburg, The Netherlands: Tilburg University Press.
- Huang, J. L., Bowling, N. A., Liu, M., & Li, Y. (2015). Detecting insufficient effort responding with an infrequency scale: Evaluating validity and participant reactions. *Journal of Business and Psychology*, *30*(2), 299–311.
- Maniaci, M. R., & Rogge, R. D. (2014). Caring about carelessness: Participant inattention and its effects on research. *Journal of Research in Personality*, *48*, 61–83.
- Meade, A. W., & Craig, S. B. (2012). Identifying careless responses in survey data. *Psychological Methods*, *17*(3), 437–455.
- Roivainen, E., Veijola, J., & Miettunen, J. (2016). Careless responses in survey data and the validity of a screening instrument. *Nordic Psychology*, *68*(2), 114–123.