Is This Information Too Personal? The Relationship between Privacy Concerns and Personality

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ABSTRACT

Privacy is an important aspect of interactive system design. To clarify whether there are individual differences in privacy concerns that relate to personality, we conduct a questionnaire study with 287 participants in which we assessed privacy concerns and the "big five" personality factors *openness to experience*, *neuroticism*, *conscientiousness*, *agreeableness* and *extraversion*. Our results show that overall these five factors have low associations to privacy concerns in general and only *openness to experience* and *neuroticism* contribute significantly to privacy concerns. This is in contrast to previous studies, which show varying results. We conclude that the relationship between privacy concerns and personality factors should be re-examined with more reliable and valid instruments in the future. With this paper, we contribute with knowledge about the role of personality traits in influencing privacy concerns.

1. INTRODUCTION

Privacy in the year 2014 is more important than ever before before. With recent developments (e.g. Google Glass) and scandals (e.g. the Heartbleed bug) issues of privacy become a topic for every person using the Internet through smartphones, tablets and computers. For the design of interactive systems and products it is crucial to understand the user's information privacy concerns, that is the degree of how much a person is concern about her/his personal data in general. People vary in their degree of information privacy concerns. Malhotra, Kim and Agarwal [10] found that Internet users' information privacy concerns significantly decrease *trusting beliefs* and significantly increases risk beliefs, which in turn significantly decrease the behavioral intention to reveal personal information.

Not all users are the same. For describing differences between people, researchers often use so-called traits, which are more or less stable disposition in personality [3]. A popular model in explaining individual differences between people is the five-factor model of personality [11], consisting of "big five" dimensions which can describe human personality: *openness to experience*, *neuroticism*, *conscientiousness*, *agreeableness* and *extraversion*.

Literature on the relationship between privacy concerns and personality shows inconsistent findings and is limited to certain domains (health, location-based services) [1,5] and user groups (students). To eliminate inconsistencies and to be able to generalize the results on a broader level, we replicate the study of Junglas, Johnson and Spitzmüller [5] with privacy concerns in general, not limited to a certain domain or target group. We aim at clarifying the relationship between personality and general information privacy concerns with a sample that can be more generalized to the average population than the sample of [5].

2. PREVIOUS STUDIES

Junglas, Johnson and Spitzmüller [5] have shown that the personality factors *agreeableness*, *conscientiousness* and *openness to experience* affect privacy concerns. However, their study is limited to the context of location-based services and the example of an in-car navigation system. Furthermore, the authors used a student sample, which limits generalization on other populations. Korzaan and Boswell [6] show that *agreeableness* has a significant influence on privacy concerns. Stone [13] has shown that *introversion* and values regarding *control over personal information* are positively associated to perceptions of privacy invasions. Bansal [2] showed that *conscientiousness*, *emotional instability* (also called neuroticism) and *extraversion* are positively associated with Internet users' information transmission security concern, which is similar to the construct of privacy concerns.

Bansal, Zahedi and Gefen [1] have examined the relationship between *extroversion*, *agreeableness*, *emotional instability* (comparable to *neuroticism*), *conscientiousness*, *intellect* (which is sometimes interpreted as *openness to experience*) and *perceived health information sensitivity* in the web, as well as the relationship between perceived health information sensitivity and *health information privacy concerns*. They found *agreeableness* and *intellect* to be significantly related to *perceived health information sensitivity*, which in turn significantly predicts *health information privacy concerns*. However they have not examined the direct relationship between the personality factors and health information privacy concerns.

In a literature review on personality factors in information systems research, Maier [9] could not identify studies examining the relationship between higher-order traits (such as big five personality factors) and narrower traits or IT-specific narrow traits (such as IT privacy concerns). Liu, Ang and Lwin [8] note that studies on the relationship between personality traits and privacy concern are limited and that the studies show mixed results [1,5,6]. In their study on the relationship between personal information disclosure behavior the authors argue that privacy concern is a potential mediator between personality factors (in this study narcissism an social anxiety) and personal information disclosure behavior.

3. METHOD

3.1 Research Question and Hypotheses

We want to bring further light to the research question how privacy concerns and personality factors are associated. Based on previous research [1,5,6,13], we pose the following research model and hypotheses.

- *H1: Openness to experience is positively associated to privacy concerns.*

People who are open to experience are more curious, appreciate art and adventure and are supposed to reflect more about things. We hypothesize that people who reflect more about ongoing things have a higher concern for information privacy.

- *H2: Neuroticism is positively associated to privacy concerns.*

People with high neuroticism experience easily unpleasant emotions such as anger, and vulnerability. We believe that people who are easily upset will also experience more privacy concerns.

- *H3: Conscientiousness is positively associated to privacy concerns.*

Conscientious people are organized, self-disciplined and dutiful, which is why we believe that people who are more conscious will have more privacy concerns than people who are less conscious.

- *H4: Agreeableness is negatively associated to privacy concerns.*

People who are agreeable are compassionate, helpful, trusting and cooperative. We hypothesize that people who put more trust into people and things will have less privacy concerns.

- *H5: Extraversion is negatively associated to privacy concerns.*

Extraverts are more outgoing than introverts, are sociable and have the tendency to seek stimulation in social situations. We believe that more extraverted people experience less privacy concerns than more introverted people. The posed relationship in the hypotheses are illustrated in Figure 1.

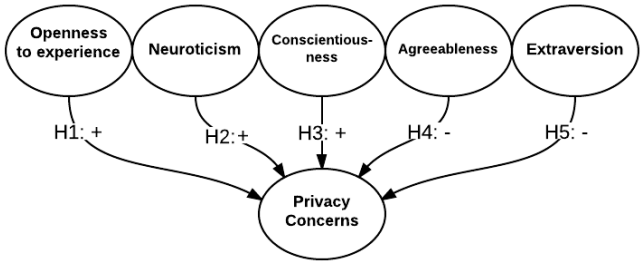

Figure 1. Proposed research model and hypotheses

3.2 Variables and Reliabilities

For assessing privacy concern, we used the one-dimensional global information privacy concern (GIPC) questionnaire [12], adapted by [10], which assesses context independent and general information privacy concerns. GIPC represents a single latent factor and has 6 items. For assessing personality factors, the multi-dimensional Big Five Inventory-SOEP (BFI-S) [4] was used. The BFI-S assesses *openness to experience*, *neuroticism*, *conscientiousness*, *agreeableness* and *extraversion*. Overall, the BFI-S has 15 items with 3 items per factor. All items were rated on a 7-step Likert scale. Both questionnaires were chosen because of their shortness.

For calculating, scale reliability (internal consistency of scales), Cronbach's Alpha was calculated. A Cronbach's Alpha close to 0 indicates no reliability, a Cronbach's Alpha closes to 1 indicated perfect reliability. GIPC has a reliability of .763. For BFI-S, reliabilities are the following: *Conscientiousness* (.598), *agreeableness* (.511), *openness to experience* (.675), *extraversion* (.817) and *neuroticism* (.693). The low scores for reliabilities of the BFI-S are consistent with published reliabilities of this measure and of personality measures in general [7].

3.3 Proceeding and Sample

A questionnaire with the two scales (GIPC and BFI-S) as well as two demographic variables (sex and age) was distributed at a popular science festival in Vienna, Austria. The questionnaire was handed out on three consecutive days. The festival in general attracts a variety of people from almost all ages and backgrounds. We collected questionnaires from 326 people, however due to missing values we used data from n= 287 participants for hypotheses testing. The mean age was 36 years (SD= 15). 51.6% of participants was female.

3.4 Hypotheses Testing

We calculated a multiple linear regression with forced entry. The proportion of variance explained by the model is .038 (adjusted r square), which means that about 3.8% of variance in privacy concerns can be explained by the variance of personality factors. According to an analysis of variance, the model is a significant fit of the data overall: $F(5,281) = 3.252$; $p < .05$. For determining the individual contribution of each personality factor, standardized beta coefficients and t-tests are reported (see Table 1). Beta coefficients represent the size of contribution of one personality factor to privacy concerns and the t-test indicates if this contribution is significant.

Personality factor	Beta coefficient	t-test
Conscientiousness	-.006	p > .05
Agreeableness	.009	p > .05
Openness to Exp.	.188	**p < .05**
Extraversion	-.030	p > .05
Neuroticism	.169	**p < .05**

Table 1. Standardized beta coefficients and t-tests (significances) for the personality factors

The results are additionally illustrated in Figure 2. The beta coefficients are low/non-significant (*conscientiousness*, *agreeableness*, *extraversion*) to medium/significant (*openness to experience*, *neuroticism*).

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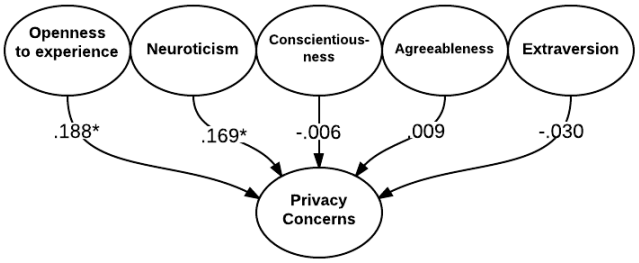

Figure 2. Tested research model and hypotheses (* p < .05)

4. INTERPRETATION AND DISCUSSION

Based on the data, we can confirm H1 and H2, but we have to reject H3, H4 and H5. Our questionnaire study shows that higher *openness to experience* and higher *neuroticism* are positively related to privacy concerns. This is partly in accordance to previous research: [5] concerning *openness to experience* and [1] concerning *neuroticism*. However this is also partly not in accordance to previous research :[5] and [6] have both shown that *agreeableness* has a significant influence on privacy concerns and [2] has shown that *conscientiousness*, *neuroticism* and *extraversion* have a significant influence on privacy concerns. The results of these studies are very different. This could be due to different measures that have been used to assess personality factors and privacy concerns or due to different locations and cultural influences. We assume that privacy concerns change fast. This could be a reason why our results deviate from the study conducted in 2008 on the same topic [5]. However, in contrast to other studies that investigated the same relationship, we did not investigate privacy concerns in a special domain (e.g. location-based services), but on a general level. This could also be responsible for the inconsistent results. Furthermore, we used a different sample than comparable studies. Privacy concerns could be highly specific to individual experiences and attitudes, which would explain why the relationships between more general personality traits and privacy concerns differ over several studies.

Overall the contribution of personality factors to privacy concerns can be seen as small. This could be due to the low reliabilities of the personality scales (because of few items per scale) or due to the fact that we – in contrast to [5] – examined privacy concerns in general. As the previous literature and our data show inconsistent results on the relationship between personality factors and privacy concerns, this relationship should be re-examined in future work. A possibility to get clearer results would be to use more reliable (e.g. longer) or other (e.g. more valid) assessments of personality factors and privacy concerns. Additionally, it the temporal and situational aspects of privacy concerns have to be examined to get a holistic picture of this construct.

5. SUMMARY AND CONCLUSION

In this paper we have presented a questionnaire study which investigates the relationship between the "big five" personality factors and privacy concerns. At a research festival in Vienna, Austria we collected data from 287 participants. Our results show that that overall the influence of personality factors on privacy concerns is low. However, higher openness to experience and higher neuroticism are associated to higher privacy concerns. It is crucial for designers to understand privacy concerns in order to design interactive systems that align to users' needs. Users are different and have different needs. Designers need to study and to understand these differences. Personality traits can be a tool to understand differences in privacy concerns, however our study suggest that we should also look for other possible explanation factors, such as higher order cognitive functions (e.g. intelligence).

6. ACKNOWLEDGMENTS

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