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Big Five Personality Dimensions and Disintegration as Antecedents of Vertical and Horizontal Internet Privacy Concerns

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Abstract

Given the role that internet privacy concerns (IPCs) have in individuals' online behaviors, it is essential to understand how personality shapes people's concerns about privacy online. The five-factor model of human personality—with the Big Five personality dimensions of openness, conscientiousness, extraversion, agreeableness, and neuroticism—has been widely used to study the formation of internet users' privacy concerns. However, existing literature has investigated only vertical (institutional) IPCs, while there is no corresponding research on horizontal (peer) IPCs. The role of a recently proposed personality trait, disintegration, which captures individuals' proneness to perceive connections among unrelated phenomena and thus complements existing personality models, has also not been examined yet. This preregistered study addressed these gaps by investigating the associations of the Big Five personality dimensions and the disintegration trait with vertical and horizontal IPCs among internet users. The hypotheses and research questions were addressed through path analysis on a sample of internet users (N = 797) aged 18 years or older, recruited through probability-based sampling (response rate 42%). The results showed that agreeableness was associated with greater vertical IPCs, whereas openness with lower and disintegration with higher horizontal IPCs. The association between disintegration and vertical IPCs was moderated by previous privacy violations. The findings suggest that personality traits have different associations with vertical and horizontal IPCs, warranting further investigation of the role of the disintegration trait in individuals' online privacy perceptions and behaviors.

Keywords: Big Five; disintegration; internet; internet privacy concerns; personality traits; vertical and horizontal privacy

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Introduction

Internet privacy concerns (IPCs) are a central concept in research on individual privacy in online environments (Yun et al., 2019). Given that increased IPCs lead to limited self-disclosure (Wang et al., 2023), low engagement with online services (Baruh et al., 2017), and use of protective measures (Baruh et al., 2017; Kim et al., 2023), scholars have been extensively researching its antecedents (Smith et al., 2011; Yun et al., 2019). While most of these factors, such as personal experiences, cultural expectations, or environmental characteristics, change over time, others, like personality, remain relatively stable throughout a person's life (Junglas et al., 2008). Because personality is

considered as one of the initiating factors of individuals' threat appraisals (Rogers, 1983; Tomaka & Magoc, 2021), its stability can help scholars understand individuals' tendencies to form IPCs regardless of transitory events.

The five-factor personality model—with the Big Five personality dimensions of openness, conscientiousness, extraversion, agreeableness, and neuroticism (McCrae & Costa, 1987)—has been often used to understand how an individual's personality shapes their IPCs. A succinct review of past studies shows that extraversion is typically associated with lower IPCs, whereas openness, conscientiousness, agreeableness, and neuroticism with higher IPCs (Bartol et al., 2023). Despite considerable research into these aspects, two extensions can improve our understanding of how personality relates to individuals' IPCs.

First, scholars have increasingly emphasized the importance of distinguishing between *vertical* (institutional) and *horizontal* (peer) IPCs (Quinn & Epstein, 2023). Vertical IPCs refer to concerns about access and misuse of an individual's information by institutions, while horizontal IPCs are related to concerns about other internet users accessing or misusing an individual's information. This distinction is important, as different types of IPCs can lead to different outcomes (Masur, 2019) and can also have different antecedents (Lutz & Ranzini, 2017). However, personality traits have been investigated as predictors only of either general or vertical IPCs but not horizontal IPCs (see Table 1).

Second, Knežević and colleagues (2017) have proposed a new personality trait, *disintegration*, which complements the Big Five traits by capturing an individual's tendency to perceive connections among unrelated phenomena. Given that individuals can hold incorrect views about what others do with their information on the internet, which can also result in suboptimal privacy protection and harm (Herbert et al., 2023), investigating how disintegration is associated with internet users' vertical and horizontal IPCs in online settings is important. This would not only bring insights into whether some segments of the population are (more) predisposed to make questionable assessments of their privacy online but could over time lead to the development of strategies to assist this population in making informed privacy decisions.

This preregistered study addressed these two research gaps by testing 12 hypotheses regarding the associations between the six personality traits (openness, conscientiousness, extraversion, agreeableness, neuroticism, and disintegration) and internet users' vertical and horizontal IPCs. In addition, two research questions (RQs) were explored: RQ1 addressed potential differences in the associations of the same personality trait with vertical and horizontal IPCs, while RQ2 examined potential differences in the associations of neuroticism and disintegration with IPCs, depending on whether an individual has or has not experienced privacy violations on the internet. The hypotheses and RQs were tested using path analysis on data from a sample (N = 797) of internet users aged 18 years or older recruited through probability-based sampling.

Vertical and Horizontal Internet Privacy Concerns

Internet privacy concerns (IPCs), a subset of broader information privacy concerns (Hong & Thong, 2013), can be defined as individuals' beliefs about the potential loss of privacy when submitting information to a known or unknown entity on the internet (Bartol et al., 2021, p. 1). Although IPCs are often understood in general and singular terms, research has emphasized the need to distinguish between vertical and horizontal IPCs (Masur, 2019; Quinn & Epstein, 2023). Vertical IPCs refer to individuals' views about potential privacy infringements that can result from the collection and subsequent (mis)use of their information by companies, organizations, or institutions. Conversely, horizontal IPCs are related to concerns that other individuals (e.g., friends, colleagues, and strangers) could inappropriately access, share, or use their information (Masur, 2019; Neves et al., 2023). Although both types of IPCs are linked, each refers to inherently distinct types of relationships and can thus have varied antecedents and outcomes (Quinn & Epstein, 2023).

A considerable number of empirical studies shows how valuable the distinction between vertical and horizontal IPCs is for a nuanced understanding of individuals' privacy perceptions and behaviors in different online domains (e.g., Jozani et al., 2020; Krasnova et al., 2009; Lutz & Ranzini, 2017; Masur, 2019; Neves et al., 2023). Krasnova and colleagues (2009) were one of the first to examine how vertical and horizontal IPCs influence self-disclosure on social network sites. They found that users were more concerned about institutional than social threats, with vertical IPCs leading to limited self-disclosure and horizontal IPCs increasing users' conscious adjustments of the information being disclosed. Lutz and Ranzini (2017) explored vertical and horizontal IPCs in the case of dating apps, specifically Tinder. They found that users were more concerned about how Tinder uses their data than about privacy invasion from other users. Furthermore, while their study showed that narcissism was associated with

greater and loneliness with lower vertical and horizontal IPCs, the motives for using Tinder were associated only with horizontal IPCs and age only with vertical IPCs (Lutz & Ranzini, 2017). The study by Jozani and colleagues (2020) focused on the case of peer-to-peer payment apps. They showed that participants had greater vertical than horizontal IPCs. Interestingly, perceived risks of self-disclosure led to greater and control over the disclosed information to lower horizontal IPCs, whereas perceived sensitivity of the disclosed information increased only vertical IPCs. Moreover, they found that both vertical and horizontal IPCs result in lower engagement with peer-to-peer payment apps, although the effect size of horizontal IPCs was somewhat larger.

Overall, research on vertical and horizontal IPCs suggests that although users are generally more concerned about institutional practices, horizontal IPCs have an important and unique role. Therefore, investigating the relationships between personality and vertical and horizontal IPCs can enhance our understanding of the role that individuals' dispositional tendencies have in their privacy-related cognitions and subsequent behaviors.

Personality Traits

An individual's personality can be an important predictor of their perceptions and intentions in online environments (Bartol et al., 2023; Bosnjak et al., 2007). Personality is often examined through the study of personality traits (John & Srivastava, 1999) which are understood as relatively stable patterns of individuals' thinking or behaving (Soto, 2018). There are several models of personality, but the five-factor model is one of the most widely accepted taxonomies of human personality (John & Srivastava, 1999; McCrae & Costa, 1987). This model differentiates between the Big Five personality dimensions of openness, conscientiousness, extraversion, agreeableness, and neuroticism (McCrae & Costa, 1987).

Recently, Knežević and colleagues (2017) proposed the existence of a personality trait that is independent of the Big Five traits and that extends our understanding of human personality. They proposed and empirically validated the existence of *disintegration*, a trait defined as psychosis proneness that stems from "the disintegration of the information processing systems responsible for reality testing, which results in peculiar, incoherent and distorted cognitions, emotions, and behavior" (Knežević et al., 2017, p. 189). Disintegration has been found to be linked with questionable medical practices as well as irrational, superstitious and conspiracy beliefs, among others (see Lazarević et al., 2023). Accordingly, we assume that disintegration could be responsible for distorted evaluations of online privacy among internet users, potentially leading to inappropriate actions or even harmful consequences. Investigating how disintegration links to vertical and horizontal IPCs is thus an important step in understanding the role of psychotic tendencies in online privacy perceptions and behaviors.

A review of related literature (Table 1) shows that past studies have examined relationships between the Big Five personality dimensions and either vertical IPCs or have not differentiated between vertical and horizontal IPCs (i.e., focused on general concerns), while no study has explored horizontal IPCs thus far. Scholars have also not investigated the role of disintegration and its links to either type of IPCs. In what follows, we build on past studies to propose 12 hypotheses about how the six personality traits are associated with vertical and horizontal IPCs.

Big Five Personality Dimensions

Openness, or *openness to experience*, is a trait that describes individuals who are original and imaginative, have wide interests, and are unconventional, as well as artistic and creative (John & Srivastava, 1999; McCrae & Costa, 1987). Open individuals are also considered to be daring, prone to experimentation, and have a desire to try new things (McCrae & Costa, 1987). These latter aspects of openness have led some scholars to assume that open individuals are less concerned about their privacy (Pentina et al., 2016; Tang et al., 2022; Yeh et al., 2018). The argument is that they value new experiences more than their privacy and are thus less worried that the disclosure of information would result in privacy violations (e.g., Yeh et al., 2018).

Table 1. *Literature on Personality Traits and Internet Privacy Concerns (based on Bartol et al., 2023).*

Source	Country	Context	Privacy concerns	Sample size	O	C	E	A	N	D
Junglas et al. (2008)	US	Location-based services	Vertical	378	+	+		–		
Korzaan & Boswell (2008)	US	General internet use	Vertical	230				+		
Brecht et al. (2012)	/	Use of privacy-enhancing software	General	151					+	
Hin et al. (2015)	Malaysia	Location-based services	Vertical	278	+	+	+			
Osatuyi (2015)	US	Social media	Vertical	298		+		+		
Bansal et al. (2016)	US	Finance	General	367				+	+	
	US	E-commerce		367			–	+	+	
	US	Health		367				+	+	
Pentina et al. (2016)	US	Mobile apps	Vertical	106						
	China	Mobile apps		120						
Chen et al. (2017)	Vietnam	Social network sites	General	298	+	+	–	+		
Yeh et al. (2018)	Taiwan	E-commerce	Vertical	345				+		
Özkan (2018)	Turkey	General internet use	General	402	+	+	–			
Škrinjarić et al. (2018)	Croatia	General internet use	General	2,060			–		+	
van der Schyff et al. (2020)	/	Social network sites	Vertical	576	+	+			+	
Bawack et al. (2021)	US	Voice shopping	Vertical	224					+	
Tang et al. (2022)	China	Mobile apps	Vertical	455		+		+	+	
Bartol et al. (2023)	Slovenia	E-commerce	Vertical	3,736	+	+	–			
Najafian et al. (2024)	/	Tourism group recommendation systems	General	278		+	–	–		
Cai & Yu (2024)	China	Intelligent connected vehicles	Vertical	481			–	+	+	

Note. O = openness; C = conscientiousness; E = extraversion; A = agreeableness; N = neuroticism; D = disintegration; + = significant positive relationship; − = significant negative relationship; empty cells = no significant relationship or significance not reported or not studied; / = not reported.

A few scholars put forward the opposite proposition—openness leads to greater IPCs (Bartol et al., 2023; Junglas et al., 2008; van der Schyff et al., 2020). These scholars argue that because open individuals are curious, imaginative, and have wide interests, they are also aware of the problems that information disclosure and technological developments can have for their privacy, thus making them concerned (e.g., Junglas et al., 2008). This proposition has received empirical support (Table 1), and we therefore hypothesize that openness is positively associated with IPCs. Although we examine both vertical and horizontal IPCs in this study, no direct theoretical or empirical evidence suggests that the polarity of the association (i.e., positive or negative) of openness differs based on the type of IPC. Therefore, we propose the following:

H1a: Openness is positively associated with vertical internet privacy concerns.

H1b: Openness is positively associated with horizontal internet privacy concerns.

Conscientiousness is a trait that describes not only individuals who like order and are well organized (Donnellan et al., 2006) but also those who are careful, efficient, hardworking, and willing to achieve their goals (McCrae & Costa, 1987). Previous privacy research is largely in agreement that conscientious individuals are worried about their privacy. This is because of their generally careful nature, which leads them to consider possible threats and risks (Junglas et al., 2008; Yeh et al., 2018), thereby resulting in evaluations of privacy invasion as more hazardous compared to less conscientious people's evaluations (Bansal et al., 2016). Thus, we assume that more conscientious individuals will have higher vertical and horizontal IPCs:

H2a: Conscientiousness is positively associated with vertical internet privacy concerns.

H2b: Conscientiousness is positively associated with horizontal internet privacy concerns.

Extraverted individuals are sociable, affectionate, friendly, and talkative, but they can also be assertive, forceful, and dominant (John & Srivastava, 1999; McCrae & Costa, 1987). "Lively sociability" is considered the core aspect of

extraversion (McCrae & Costa, 1987, p. 87). It is then reasonable to assume that extraverted people enjoy social interactions, in which they often share their personal information, and are therefore less concerned about their privacy (Bartol et al., 2023). Stone (1986) reported that introverted individuals consider requests for personal information to be more invasive than extroverted individuals do, presumably because they are more likely to fear that disclosures may result in negative evaluations. Using these considerations and past empirical findings (van der Schyff et al., 2020; Yeh et al., 2018), we assume that higher extraversion leads to lower vertical and horizontal IPCs:

H3a: Extraversion is negatively associated with vertical internet privacy concerns.

H3b: Extraversion is negatively associated with horizontal internet privacy concerns.

McCrae and Costa (1987) explained that *agreeableness* is best understood by considering its opposite pole, *antagonism*. Antagonistic people tend to be mistrustful, skeptical, and uncooperative, as well as unsympathetic, stubborn, and rude (McCrae & Costa, 1987). Thus, agreeable people are trusting; they focus on others, sympathize with them, and are cooperative, considerate, and understanding (John & Srivastava, 1999; McCrae & Costa, 1987). The trusting nature of agreeable people has led some scholars to assume that being agreeable also leads to lower privacy concerns, as such people would not only consider that privacy violations are less likely to happen but that they would also be less harmful (Junglas et al., 2008; Pentina et al., 2016). However, scholars also argue that agreeable people are likely to have higher IPCs. The argument is that such people are attentive to how their disclosure activities could cause privacy harm not only to them but also to others (van der Schyff et al., 2020). They could hold these views because they are sympathetic and cooperative. Furthermore, should privacy violations occur to others, agreeable individuals might sympathize with them and feel as if these violations happened to them (Korzaan & Boswell, 2008). As empirical evidence also suggests a positive relationship between agreeableness and IPCs (Table 1), we assume that more agreeable people will have higher vertical and horizontal IPCs:

H4a: Agreeableness is positively associated with vertical internet privacy concerns.

H4b: Agreeableness is positively associated with horizontal internet privacy concerns.

Neuroticism refers to emotional instability and the tendency to be insecure and temperamental and to worry a lot (McCrae & Costa, 1987). Neuroticism is generally associated with feeling more negative emotions (McCrae & Costa, 1987). These tendencies toward negative emotions and worries have been proposed to result in increased privacy concerns. In fact, such propositions have received empirical confirmation (e.g., Bansal et al., 2016; Tang et al., 2022). Thus, we hypothesize that individuals who are more neurotic are also more likely to have higher vertical and horizontal IPCs:

H5a: Neuroticism is positively associated with vertical internet privacy concerns.

H5b: Neuroticism is positively associated with horizontal internet privacy concerns.

Disintegration

Disintegration has been conceptualized as a trait indicating proneness to psychosis (Knežević et al., 2017). Psychosis is a psychological disorder that refers to impaired reality testing, either through delusions (i.e., false beliefs even in the presence of evidence) or hallucinations (i.e., perceptions occurring without external stimuli; Arciniegas, 2015). However, disintegration as a personality trait does not indicate whether one has or does not have psychosis, so it is not a disruptive or pathological state. Rather, it is a trait that describes an individual's tendency to connect disparate events and assume causality among them (Knežević et al., 2017). Interestingly, this suggests that the other end or pole of disintegration refers to a tendency to make causal assumptions only when clear and direct evidence exists. As much as conjectures are sometimes required and valuable (e.g., for creativity), one can reason that neither too much nor too little disintegration is beneficial. In fact, Knežević and colleagues (2017) reported that disintegration is normally distributed in the population.

As shown in Table 1, no study has examined the relationship between disintegration and IPCs, so the literature is void of empirical evidence. Relying on the nature of disintegration, we suggest that disintegration leads to a higher level of IPCs. Specifically, highly disintegrated individuals are likely to hold false beliefs. Accordingly, they could perceive that their (personal) data are collected in ways that are not really true, in turn making them concerned about their privacy. One such example could be the rather widespread belief that our smartphones are constantly

listening to us and that these recordings are then used by companies and vendors for surveillance or targeted advertising. This belief seems to persist, although little evidence exists that the industry is engaged in such surveillance (Tidy, 2019). Herbert and colleagues (2023) found in their large-scale cross-country survey that there is a positive association between being concerned about privacy and security and having misconceptions about privacy and security, which supports the above rationale.

Disintegration is also related to paranoia (Knežević et al., 2017), which refers to having (false) beliefs about being observed or persecuted (Freeman et al., 2011). As one could reasonably expect that paranoia is positively linked to IPCs, it seems likely that the same holds for disintegration. Relatedly, disintegration has also, in some measure, been linked to depression and thus to emotional instability, thereby having a small to moderate positive correlation with neuroticism (Knežević et al., 2017). As neuroticism has been found to be a positive predictor of IPCs (see Table 1), it is reasonable to expect that this also results in a positive relationship between disintegration and IPCs. Given that people scoring high on the disintegration trait are likely to be prone to negative feelings and paranoia and to make conjectures about being observed and listened to when they are most likely not, we hypothesize that they will also score higher on vertical and horizontal IPCs:

H6a: Disintegration is positively associated with vertical internet privacy concerns.

H6b: Disintegration is positively associated with horizontal internet privacy concerns.

Differential Effects of Personality Traits

Thus far, we have assumed that each of the personality traits under examination is associated with vertical and horizontal IPCs in the same way (i.e., positively or negatively). This is a reasonable assumption, given that vertical and horizontal IPCs are specific expressions of general, nondifferentiated concerns about privacy on the internet (Masur, 2019; Neves et al., 2023). Indeed, previous research has found that vertical and horizontal IPCs are typically moderately to highly correlated. For example, in the study by Zhang and colleagues (2022) the average correlation between the dimensions of vertical and horizontal IPCs was r = .32, Neves and colleagues (2023) found a correlation of r = .47, whereas Masur (2019) reported a correlation of r = .55.

Despite these commonalities, the strength of the association of the same personality trait could possibly differ between vertical and horizontal IPCs. For instance, because extraversion relates to sociability, it could be that its relationship with horizontal IPCs is stronger than with vertical IPCs, as there is greater compatibility between the focus of the predictor and the outcome (Quinn & Epstein, 2023). While differences in these effects are perhaps easier to anticipate in some cases (e.g., extraversion) and more difficult in others (e.g., neuroticism), we address such potential differences in an exploratory manner with the following RQ:

RQ1: What are the differences in the strength of the associations between personality traits and vertical and horizontal internet privacy concerns?

Moderating Effect of Previous Privacy Violations

An additional exploratory interest of the current study is the moderating effect of previous internet-related privacy violation experiences on the relationship between neuroticism and disintegration on both vertical and horizontal IPCs. Previous privacy violation experiences refer to an individual's past experiences of being a victim of what they consider to be privacy violations (Li et al., 2014). We focused on neuroticism since it is the strongest and most consistent psychological predictor of threat appraisals among the Big Five personality dimensions (e.g., Kilby et al., 2018; Tomaka & Magoc, 2021). Because neuroticism refers to emotional instability and a tendency to worry a lot (McCrae & Costa, 1987), it is reasonable to assume that individuals who have experienced mishandling of their private information on the internet could have a heightened sense of privacy risks compared to individuals who have not experienced such violations. Similarly, disintegration encapsulates proneness to make connections among unrelated phenomena (Knežević et al., 2017), so disintegrated individuals who have experienced privacy violations on the internet in the past would possibly conjecture that such mishandling is also likely to happen to them in the future (e.g., because someone is targeting them). Therefore, the associations of neuroticism and disintegration with vertical and horizontal IPCs are possibly stronger among those who have already experienced privacy violations. To the best of our knowledge, no empirical research has tested these relationships, so this study addresses the moderating role of previous privacy violations in an exploratory fashion, posing the following RQ:

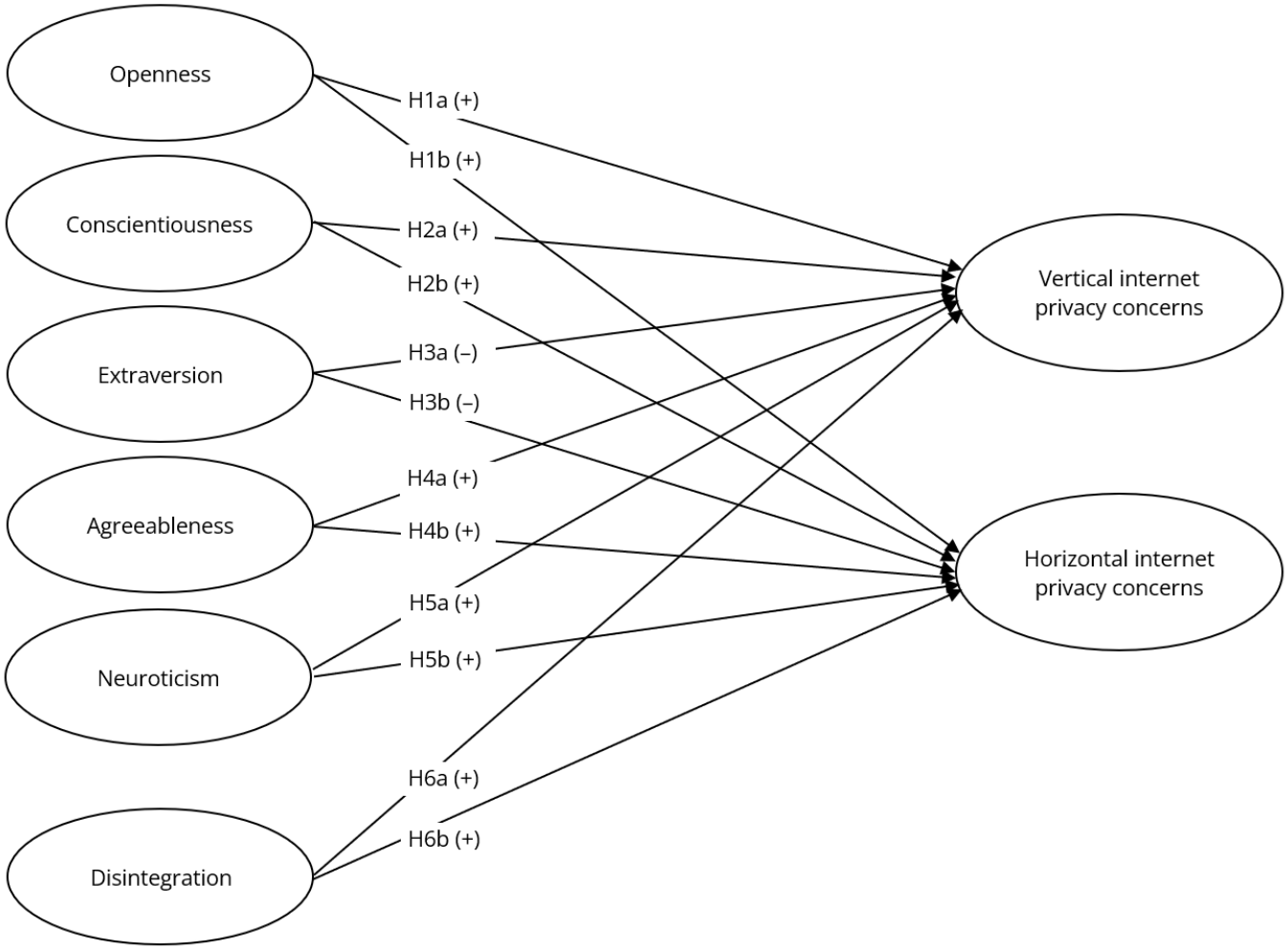
RQ2: How does the experience of previous privacy violations on the internet moderate the associations of neuroticism and disintegration with vertical and horizontal internet privacy concerns?

Covariates

We considered two covariates—age and gender—through which we controlled for potential spurious associations between the constructs of interest. The selection of these covariates was preregistered. Age and gender were chosen because they cannot be influenced by personality traits or IPCs, although they can influence them and, in turn, can represent their common causes (Kline, 2023). Indeed, studies have shown that age and gender correlate with personality traits (Goldberg et al., 1998) and IPCs (Bartol et al., 2023). We do not control for other covariates (e.g., education or privacy control) because they might be intermediaries between personality traits and IPCs, and the exclusion of such intermediaries still results in correct estimates of the total effect of the predictors on the outcome (Kline, 2023, p. 81). Covariates were included in all analyses aimed at testing the hypotheses or answering the RQs.

The research model depicting the 12 proposed hypotheses and two RQs is presented in Figure 1.

Figure 1. *The Research Model with 12 Hypotheses and Two Research Questions.*



RQ1: What are the differences in the strength of the associations between personality traits and vertical and horizontal internet privacy concerns?
RQ2: How does the experience of previous privacy violations on the internet moderate the associations of neuroticism and disintegration with vertical and horizontal internet privacy concerns?

Note. Age and gender included as covariates.

Methods

Preregistered Study

The hypotheses, RQs, and data collection and analysis methods used in this study were preregistered on Open Science Framework (https://osf.io). The preregistration, data, code, and results of the analyses are available at https://osf.io/z3a8u/. All the procedures outlined in the preregistration were followed, except for some changes in the wording of hypotheses and RQs as well as the sampling procedure. The hypotheses and RQs were originally posed in causal terms but were later reformulated to suggest associations in line with the cross-sectional nature of the study. For the sampling procedure, the plan was to recruit participants from the Slovenian Probability Panel (https://1ka.cdi.si/panel?lang_id=2), hosted by the Centre for Social Informatics, Faculty of Social Sciences, University of Ljubljana. However, as this study was part of a larger project that required adjusted sampling procedures, minor adaptations to the procedures outlined in the preregistration were made to improve the response quality and limit the respondent burden. The sampling method is described in the next section.

Data Collection

The data for this study were collected as part of a larger research project investigating individuals' internet use, civic engagement, and political views, as well as attitudes toward hate speech and disinformation. Participant recruitment and data collection were conducted in Slovenia from June to August 2024 by the Centre for Social Informatics, Faculty of Social Sciences, University of Ljubljana. Potential participants were identified from the Central Register of Population using two-stage random sampling with stratification by type of settlement and the statistical region of residence. A total of 8,917 persons aged 17 years or older and living in Slovenia were invited through postal mail and asked to complete a web survey. The survey consisted of five thematic blocks. All participants completed the block on internet use and demographic characteristics. They were then randomly assigned to one of the four other blocks, of which one included questions on personality traits and IPCs. The respondents received compensation in the form of coupons worth €5 or €10, depending on the randomly assigned group. Up to three reminders were sent to each person. The survey was completed by 3,766 respondents, representing a response rate of 42%. The median completion time was 35 minutes and 44 seconds.

For this study and in line with the preregistration, we selected only those respondents who answered the questions on personality traits and IPCs, were aged 18 years or older, and were internet users, that is, used the internet in the last three months (N = 811). We analyzed the quality of responses by inspecting the questionnaire response time and uniformity of responses. We excluded 14 respondents (i.e., speeders) because of very short response times (< 1/3 of the median) coupled with high uniformity of responses (> 70%). The characteristics of the resulting sample (N = 797) are shown in Table 2. The sample is slightly gendered (i.e., a higher percentage of females) and more educated compared to Slovenia's population of internet users but is otherwise representative in terms of age and residential area.

Ethical review and approval for this study were waived by the Ethics Committee of the Faculty of Social Sciences, University of Ljubljana, as the research did not go beyond the everyday activities of the participants, and no personally identifiable information was collected. Informed consent was obtained from all study participants in line with the General Data Protection Regulation (GDPR).

Table 2. *Sociodemographic Characteristics of the Sample.*

Variable	Category	Relative Frequency (%) [a]
Gender	Male	42.9
	Female	55.5
Age [b]	18–30 years	21.1
	31–45 years	24.0
	46–60 years	25.3
	61 years or older	23.1
Education	High school or less	49.4
	Higher education	49.2
Residential area	Urban	55.8
	Rural	43.0

Note. Total percentages may not add up to 100 because of rounding and/or missing values. [a]*N* = 797. [b]*M* = 46.7 years, *SD* = 17.3 years.

Measures

All instruments were adopted from the existing literature. Item wordings and descriptive statistics are presented in Appendix A. Translation of the measures was done by a researcher proficient in English and Slovenian, and then the translations were checked and discussed with other researchers. The focus was on retaining the original meaning rather than keeping the items terminologically equivalent (Harkness et al., 2004). The measures were validated through exploratory factor analysis (EFA), as described in the Data analysis section.

Vertical and Horizontal IPCs

Items for vertical and horizontal IPCs were taken from the study by Neves and colleagues (2023). The items for vertical IPCs focus specifically on the practices of companies, whereas the items for horizontal IPCs center on the practices of acquaintances. Each type of IPCs was measured using a five-item scale with response options of 1 = *completely disagree* to 7 = *completely agree*. To obtain the construct scores, the items for each scale were averaged with higher scores indicating greater concerns. Respondents had higher vertical IPCs (*M* = 5.10, *SD* = 1.41) compared to horizontal IPCs (*M* = 4.31, *SD* = 1.66). Cronbach's alphas for these measures were α = .94 and α = .96, respectively.

Big Five Personality Dimensions

The Big Five personality dimensions were measured using the 20-item Mini International Personality Item Pool validated by Donnellan and colleagues (2006). The 20 items describe various behaviors, and the respondents are asked to indicate how accurately the statements describe them. The response options ranged from 1 = *very inaccurate* to 5 = *very accurate*. Prior to the analysis, we reversed the reverse-coded items (Appendix A). Following the EFA (see Data analysis section), we dropped two items from each of the openness, agreeableness, and neuroticism traits (Appendix A). The final scores were obtained by averaging the items for each dimension. Reliability was acceptable for all traits, with Cronbach's alpha ranging from .61 to .76. Participants scored highest on agreeableness (*M* = 3.89, *SD* = 0.63, α = .67) and conscientiousness (*M* = 3.83, *SD* = 0.63, α = .71), followed by openness (*M* = 3.26, *SD* = 0.87, α = .72), extraversion (*M* = 2.98, *SD* = 0.74, α = .76), and neuroticism (*M* = 2.65, *SD* = 0.76, α = .61).

Disintegration

Disintegration was assessed with a 10-item inventory provided by Knežević and colleagues (2017), with the response options ranging from 1 = *completely disagree* to 5 = *completely agree*. Based on the EFA, we dropped one item (i.e., *People speak ill of me*). The remaining items were averaged to obtain the construct score with higher scores indicating greater disintegration (*M* = 2.06, *SD* = 0.68). The scale was found to be reliable (α = .88).

Previous Privacy Violations

To test the moderation effects of previous privacy violations, a single item adopted from Malhotra and colleagues (2004) was used. The item asks about the frequency of being a victim of privacy violations on the internet with the following response options: 1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, and 5 = *very often*. The responses were recoded into a dichotomous variable to distinguish between those who had never experienced privacy violations (0 = *never*, *N* = 465), and those who had experienced privacy violations at least rarely (1 = *rarely or more often*, *N* = 321).

Covariates

Gender was measured as a binary variable, with 0 = *male* and 1 = *female* (42.9% male, 55.5% female), whereas age was measured as a continuous variable indicating a respondent's age in years at the time of the survey (*M* = 46.7, *SD* = 17.3).

Data Analysis

Analyses were done in the R software environment for statistical computing and graphics (R Core Team, 2022b) using the following packages: *foreign* (R Core Team, 2022a), *psych* (Revelle, 2022), *lavaan* (Rosseel, 2012), and *semTools* (Jorgensen et al., 2022).

Inspection of missingness revealed that most respondents had no (88.0%) or only one (8.8%) missing value. To avoid dropping units with missing data, we followed the procedures outlined by Newman (2014); we used pairwise deletion or the full information maximum likelihood (FIML) approach, depending on availability in a statistical package, and when calculating the respondents' construct scores, we used each person's available items to represent the construct. Next, we screened the distributions of the observed variables. Although the variables were not completely normally distributed, the deviations were not substantial (skewness ranged from −1.16 to 1.59 and kurtosis from −1.22 to 2.49). Nevertheless, when testing the hypotheses, we computed robust standard errors using the robust maximum likelihood estimator (MLR).

We used EFA to validate the measures. This approach was chosen because it enables the analysis of cross-loadings, which we deemed important as the five-factor personality model was extended with the disintegration trait. In addition, EFA is considered more appropriate than confirmatory factor analysis (CFA) for the study of personality traits (Marsh et al., 2010). The Big Five personality dimensions, disintegration, and vertical and horizontal IPCs were analyzed in separate EFAs before they were brought together into a single EFA. Because of high factor cross-loadings (> .30) or low loadings on the primary factor (< .50), we dropped seven items: two items from each of the openness, agreeableness, and neuroticism traits and one item from the disintegration trait (see Appendix A). The results of the final EFA are presented in Appendix B. We also ran a CFA on the final model which showed acceptable fit, as detailed in Appendix C. After the measures were validated, construct scores were calculated by averaging each construct's items. The correlations among constructs are shown in Table 3.

Table 3*. Correlations Among the Constructs of the Study.*

Construct	1.	2.	3.	4.	5.	6.	7.	8.
1. Openness	1							
2. Conscientiousness	−.02	1						
3. Extraversion	.13*	−.02	1					
4. Agreeableness	.08*	.17*	.09*	1				
5. Neuroticism	.03	−.17*	−.21*	−.04	1			
6. Disintegration	−.15*	−.31*	−.09*	−.10*	.34*	1		
7. Vertical IPCs	−.03	.06	.01	.16*	−.04	.01	1	
8. Horizontal IPCs	−.13*	.03	.03	.02	.03	.16*	.55*	1

Note. *$p < .05$. Pairwise deletion was used to deal with missing values (*N* = 781–797). IPCs = internet privacy concerns.

To test the hypotheses, we conducted path analysis. Although the model had zero degrees of freedom and, thus, its fit could not be tested, this approach was selected, as it enabled us to estimate the effects of the personality traits on both types of IPCs (i.e., vertical and horizontal) simultaneously, thereby also enabling the statistical comparison of these effects through chi-square difference ($_{\Delta}\chi^2$) tests. Path analysis was run with the MLR estimator, and FIML was employed to address missing values (Kline, 2023; Newman, 2014). Vertical and horizontal IPCs were allowed to be correlated.

RQ1 was assessed by constraining the paths of each personality trait on vertical and horizontal IPCs to equality and conducting the $_{\Delta}\chi^2$ test. If the test was nonsignificant, the estimates were considered equal; if it was significant, the paths were considered different. For RQ2, we conducted multigroup analysis (MGA) using the original model with all personality traits. One group included participants who had never experienced privacy violations (N = 465), whereas the other group included participants who indicated that they had experienced privacy violations rarely or more often (N = 321). The paths of neuroticism and disintegration on vertical and horizontal IPCs were set to equality across groups, and four $_{\Delta}\chi^2$ tests were run, one for each path.

In all analyses, gender and age were included as covariates, and the standard criterion of $p < .05$ was followed to determine statistically significant results.

Results

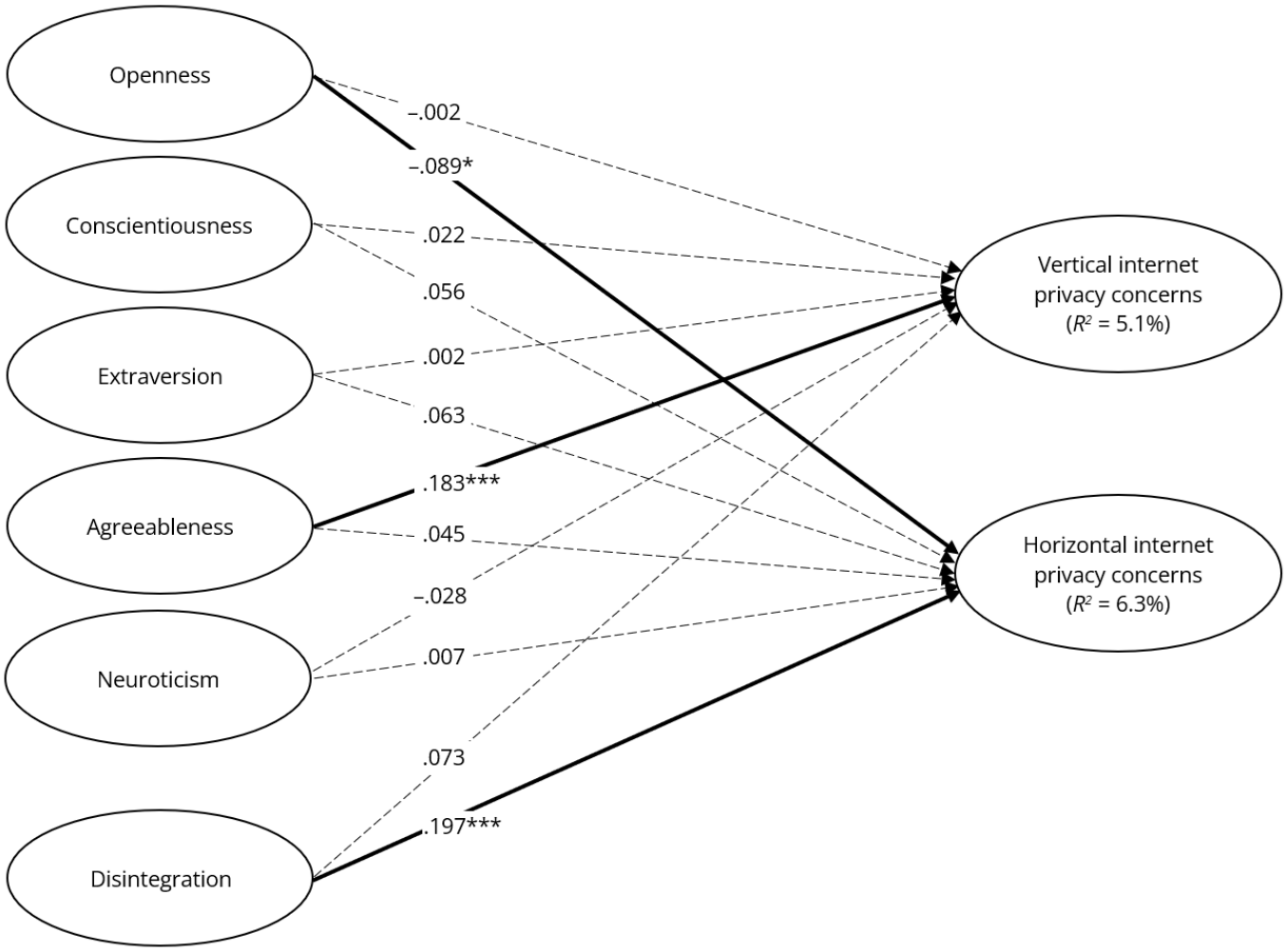
The results of the hypothesis testing offered support for only two hypotheses. We found statistically significant and positive association between agreeableness and vertical IPCs (β = .183, $p < .001$), showing support for H4a. Moreover, more disintegrated users had significantly higher horizontal IPCs (β = .197, $p < .001$), supporting H6b. Contrary to H1b, we found that more open individuals have a significantly lower level of horizontal IPCs (β = −.089, p = .021). With reference to the covariates, vertical (β = .148, $p < .001$) and horizontal (β = .126, p = .001) IPCs significantly increased with age, whereas neither type of IPC was significantly related to gender. The personality traits and covariates explained 5.1% of variance of vertical IPCs and 6.3% of variance of horizontal IPCs. The detailed results are presented in Table 4 and summarized in Figure 2.

Table 4. *Results of Hypothesis Testing with Path Analysis.*

#	Hypothesis	Estimate	Standard Error	*p*	Standardized Estimate	Support
H1a	Openness → Vertical IPCs	−0.003	0.062	.965	−.002	No
H1b	Openness → Horizontal IPCs	−0.171	0.074	.021	−.089	No
H2a	Conscientiousness → Vertical IPCs	0.050	0.090	.581	.022	No
H2b	Conscientiousness → Horizontal IPCs	0.148	0.098	.133	.056	No
H3a	Extraversion → Vertical IPCs	0.005	0.069	.947	.002	No
H3b	Extraversion → Horizontal IPCs	0.142	0.083	.087	.063	No
H4a	Agreeableness → Vertical IPCs	0.409	0.093	< .001	.183	Yes
H4b	Agreeableness → Horizontal IPCs	0.118	0.101	.242	.045	No
H5a	Neuroticism → Vertical IPCs	−0.051	0.076	.505	−.028	No
H5b	Neuroticism → Horizontal IPCs	0.015	0.087	.867	.007	No
H6a	Disintegration → Vertical IPCs	0.151	0.092	.102	.073	No
H6b	Disintegration → Horizontal IPCs	0.481	0.098	< .001	.197	Yes

Note. N = 797. IPCs = internet privacy concerns.

Figure 2. *Results of Research Model Testing with Path Analysis—Standardized Estimates.*



Note. $^{*}p < .05$, $^{***}p < .001$. N = 797. Dashed lines represent statistically nonsignificant effects. Age and gender included as covariates.

With reference to RQ1, the results of $_{\Delta}\chi^2$ tests (Table 5) indicated that the effects of openness, agreeableness, disintegration, which were significant determinants of vertical or horizontal IPCs, statistically significantly differed between vertical and horizontal IPCs. Specifically, openness had no significant relationship with vertical IPCs but resulted in lower horizontal IPCs. Agreeableness was related to greater vertical IPCs but had no significant association with horizontal IPCs. Moreover, disintegration was positively linked to horizontal IPCs but was not statistically significantly associated with vertical IPCs.

Table 5. *Results of $_{\Delta}\chi^2$ Tests Assessing Differences in the Associations between Personality Traits and Vertical and Horizontal Internet Privacy Concerns.*

Personality Trait	Estimates Tested for Inequality	$\Delta\chi^2_{(df)}$	p	Difference
Openness	$b_{O\rightarrow VIPC} \neq b_{O\rightarrow HIPC}$	$6.317_{(1)}$	.012	Yes
Conscientiousness	$b_{C\rightarrow VIPC} \neq b_{C\rightarrow HIPC}$	$1.382_{(1)}$	.240	No
Extraversion	$b_{E\rightarrow VIPC} \neq b_{E\rightarrow HIPC}$	$3.542_{(1)}$	.060	No
Agreeableness	$b_{A\rightarrow VIPC} \neq b_{A\rightarrow HIPC}$	$12.723_{(1)}$	< .001	Yes
Neuroticism	$b_{N\rightarrow VIPC} \neq b_{N\rightarrow HIPC}$	$0.712_{(1)}$	.399	No
Disintegration	$b_{D\rightarrow VIPC} \neq b_{D\rightarrow HIPC}$	$16.567_{(1)}$	< .001	Yes

Note. N = 797. b: unstandardized estimate; O = openness; C = conscientiousness; E = extraversion; A = agreeableness; N = neuroticism; D = disintegration; VIPC = vertical internet privacy concerns; HIPC = horizontal internet privacy concerns.

RQ2 asked whether there were differences in the associations of neuroticism and disintegration with vertical and horizontal IPCs between those who had not and those who had reported experiencing privacy violations. The results of MGA (Table 6) showed no moderating effects in the case of neuroticism but revealed that previous privacy violations moderated the associations between disintegration and vertical IPCs but not horizontal IPCs. Among respondents who had never experienced privacy violations, higher disintegration was linked with greater

vertical IPCs (β = .152, p = .004), while among those who had experienced privacy violations, the association was nonsignificant (β = −.112, p = .121).

Table 6. *Results of Multigroup Analysis Assessing the Moderating Effect of Previous Privacy Violations.*

Personality Trait	Estimates Tested for Inequality	$\Delta\chi^2_{(df)}$	p	Moderation
Neuroticism	No violation group $b_{N\rightarrow VIPC}$ ≠ violation group $b_{N\rightarrow VIPC}$	$0.012_{(1)}$	.913	No
	No violation group $b_{N\rightarrow HIPC}$ ≠ violation group $b_{N\rightarrow HIPC}$	$0.120_{(1)}$	.729	No
Disintegration	No violation group $b_{D\rightarrow VIPC}$ ≠ violation group $b_{D\rightarrow VIPC}$	$16.187_{(1)}$	< .001	Yes
	No violation group $b_{D\rightarrow HIPC}$ ≠ violation group $b_{D\rightarrow HIPC}$	$0.790_{(1)}$	.374	No

Note. N = 786. b: unstandardized estimate; N = neuroticism; D = disintegration; VIPC = vertical internet privacy concerns; HIPC = horizontal internet privacy concerns.

Discussion

This is the first study to examine the associations between the Big Five personality dimensions and both vertical and horizontal IPCs, as well as investigate the role of a recently proposed personality trait, disintegration, which refers to an individual's psychosis proneness. Although we found support for only two out of 12 hypotheses, the results nevertheless provide original insights into complex mechanisms that associate the personality traits of internet users with their IPCs. Importantly, by showing that personality traits link to vertical and horizontal IPCs in distinct ways as well as identifying disintegration as an important predictor of horizontal, and to some extent also vertical IPCs, this study indicates important new avenues for future research in this area.

However, we first address one striking observation that stems from the comparisons of the current study's results with those from previous research: the associations between personality traits and IPCs do not replicate well across studies. Although past research indicates certain patterns, such as agreeableness having a positive association with (vertical or general) IPCs, studies vary strongly in the personality traits they find to have a statistically significant relationship with IPCs (see Table 1). Bartol and colleagues (2023) suggested that this might be due to cultural and contextual differences between studies. We believe that this could also be a consequence of the type of IPCs being examined and the measurement instrument being used. Indeed, in their meta-analysis of 181 studies, Kim and colleagues (2023) found that the strength of association between IPCs and another variable depends on the measures used to assess IPCs.

As shown in Table 1, very few studies have compared the associations between personality traits and the same type of IPCs across countries or contexts. A notable exception is the study by Bansal and colleagues (2016) conducted in the US, which found that agreeableness and neuroticism are linked to higher IPCs in three online contexts—finance, e-commerce, and health—while extraversion was associated with lower concerns only in the case of e-commerce. Conversely, Pentina and colleagues (2016) compared the associations between personality traits and IPCs with mobile apps between the US and China but found no significant effects in either country. It seems that future studies systematically analyzing and comparing the relationships between personality traits and IPCs are needed to better understand the formation of individuals' IPCs in different situations.

Although this study's results cannot be directly compared with those of prior similar studies, given its specific contextual, cultural, and measurement aspects, it nevertheless provides valuable insights into how the same personality traits influence vertical and horizontal IPCs.

In relation to openness, we found that the hypothesized relationships were not supported in either case, although openness did have a negative association with horizontal IPCs. Curiously, past literature has put forward arguments for both positive and negative associations between openness and IPCs (e.g., van der Schyff et al., 2020; Yeh et al., 2018). While empirical research mostly supports the former result (Table 1), no study has investigated horizontal IPCs. Thus, our results suggest important differences in how this personality trait is linked to vertical and horizontal IPCs. It seems that open-minded individuals are more aware of privacy problems stemming from technological developments and are thus more concerned about their privacy in relation to organizations (e.g., Junglas et al., 2008). However, their need for new experiences and their daring nature (McCrae & Costa, 1987), as well as their lower valuations of social recognition and conformity to social norms (Dollinger et al., 1996), make them less concerned about how their peers perceive them.

Agreeableness was found to be the only trait significantly associated with vertical IPCs, but it had no significant link with horizontal IPCs. Interestingly, as in the case of openness, past research has put forth arguments for

agreeableness having either a positive or negative association with IPCs. Arguments for a positive association relate to agreeable peoples' sympathetic nature, whereas arguments for a negative association relate to them being more trusting (Junglas et al., 2008; van der Schyff et al., 2020).

There are at least two explanations for the differences in the associations between agreeableness and the two types of IPCs. On the one hand, while agreeable people sympathize with others and consider violations of others' privacy to be their own, resulting in heightened concerns, their trust possibly extends only to other people and not to companies. Thus, while sympathy might increase their concerns, the trust they place in their peers might counter this, resulting in a nonsignificant association. On the other hand, digital technologies are designed in ways that circumvent people's privacy and leak their information (Marwick, 2023). As agreeable persons are prosocial (Dollinger et al., 1996), they might consider these violations to be threats to the privacy of society and, by extension, their own privacy. However, such violations occur at the vertical level. When it comes to the horizontal level, privacy harm is much more individualized and related to personal responsibility (Marwick, 2023). Thus, being thoughtful and sympathetic to others might not result in increased concerns about how other individuals might harm one's privacy.

Conscientiousness, extraversion, and neuroticism were not significantly associated with either vertical or horizontal IPCs. Considering previous evidence (Table 1), the absence of these associations for vertical IPCs is somewhat surprising. However, such results might be due to the contextual, cultural, and methodological specifics of the current study, as already discussed above. In addition, previous privacy violations did not moderate the associations between neuroticism and IPCs, indicating that this trait is not related to IPCs regardless of whether an individual has experienced privacy violations or not. However, given the apparent contextual and cultural dependency of these relationships, scholars could further investigate whether this moderation effect is present in other cases.

Disintegration was found to be a valuable addition to the Big Five personality dimensions in explaining IPCs, especially for horizontal IPCs; the inclusion of disintegration in the model almost doubled the percentage of the explained variance of horizontal IPCs (R^2 = 3.3% vs. R^2 = 6.3%) compared with the path model without disintegration (see Appendix D). While disintegration was significantly associated with horizontal IPCs, suggesting that people who are prone to making connections among unrelated events are more likely to believe that other users might misuse their privacy, we could not confirm its positive relationship with vertical IPCs.

The absence of the latter relationship may be explained by the moderating effect of previous privacy violations. Namely, disintegration was positively associated with vertical IPCs among individuals who reported never having experienced privacy violations, while among those who reported having experienced privacy violations, the association was negative although non-significant. It seems that privacy violation experiences have a major role in how disintegration links to vertical IPCs, with the opposing associations per group cancelling each other out when the differences between the two groups are disregarded. In a substantive sense, the moderation effect suggests that people who have not experienced privacy violations rely on conjectures in their assessment of vertical IPC, similar as in the case of horizontal IPCs, whereas individuals who have experienced violations can make a more informed evaluations of potential organizational privacy risks and do not need to rely on assumptions.

The absence of moderation in the case of horizontal IPCs raises the question of why previous privacy violations moderate the association between disintegration and vertical IPCs but not horizontal IPCs. One possible explanation is that, when users face privacy violations by companies, they can rely on legal and organizational instruments to resolve the tension (Schulmeyer & Hess, 2022). Individuals who face such a violation and go through this process might, in turn, be able to make more informed evaluations of potential future risks. By contrast, while norms also guide privacy behavior among individuals (Trepte, 2021), these might be more fluid and open to interpretation. Therefore, users who have experienced privacy violations by their acquaintances may not be able to better assess future violations. The other explanation relates to the fact that we did not specify a concrete party from whom violations stem. Therefore, it is possible that the respondents mostly thought about organizational violations when responding to this question, which could explain the absence of the moderation effect in the case of horizontal IPCs. Future research could examine these issues systematically. This would be especially worthwhile, as disintegration has only recently been proposed, and little is known about how it relates to the privacy perceptions and behaviors of individuals.

This line of research is also important because IPCs are considered an important factor in self-disclosure and protection behavior (Baruh et al., 2017). If people make improper assessments about their privacy risks (e.g., they

believe that there are risks when there are none or vice versa), they might engage in inappropriate behaviors (Herbert et al., 2023). Too little privacy protection might result in violations, whereas too much protection might result in unnecessary burden and exhaustion. Meanwhile, highly disintegrated individuals could also feel overwhelmed by privacy threats and thus become cynical about the efficacy of privacy protection (Hoffmann et al., 2016). Therefore, future research could also examine how disintegration relates to self-disclosure and privacy protection behaviors, as well as how people can make realistic judgments of potential privacy violations and how their online privacy can be safeguarded.

Overall, this study confirms the conceptual significance of distinguishing between different types of IPCs. In fact, our results are aligned with the findings of a recent article, published after the preregistration of this study, addressing the associations between the HEXACO personality traits and different types of individuals' privacy needs (Dienlin & Metzger, 2024). The authors found that personality traits were generally negatively correlated with horizontal privacy needs, while the correlations were largely positive in the case of vertical privacy needs (Dienlin & Metzger, 2024). As distinguishing between different types of IPCs can provide clarity into how personality traits relate to individuals' IPCs, this is an important and valuable avenue for future research.

Limitations and Future Research

This study has some limitations that should be considered when interpreting the findings. First, in investigating the antecedents of internet users' vertical and horizontal IPCs, this study focused exclusively on personality. While personality is an important factor in directing individuals' threat appraisals (Rogers, 1983; Tomaka & Magoc, 2021), other factors also shape individuals' IPCs, such as cultural expectation, context, or social norms (Nissenbaum, 2009; Wang et al., 2023). Since individuals' IPCs are largely situational, these latter factors might have a major role in privacy assessment and might even interact with how personality links to IPCs (e.g., Bansal et al., 2016). Therefore, future studies could examine these factors alongside personality to gain a more comprehensive understanding of the formation of individuals' vertical and horizontal IPCs.

Second, although our study showed differences in the associations between personality traits and vertical and horizontal IPCs, our measurement instruments captured the two types of IPCs only in relation to two groups of actors: companies (vertical) and acquaintances (horizontal). While this was done to enable clarity of the participants' responses, future research should explore other actors (e.g., governments and strangers) to understand in depth the potential difference between the two types of IPCs. Furthermore, the focus was on IPCs on the internet generally and not in relation to a specific online context (e.g., e-commerce or social media). Thus, future studies could discern the associations between personality traits and context-specific vertical and horizontal IPCs. Other privacy-related constructs, such as privacy self-efficacy, perceived benefits, and privacy cynicism, could also be investigated. Distinguishing these constructs along the vertical and horizontal dimensions could provide great nuance into the relationships between personality traits and individuals' privacy-related perceptions and behaviors (Quinn & Epstein, 2023).

Third, the Big Five personality dimensions, although widely used, are not without criticism. For example, De Raad (1998) highlights that the Big Five dimensions might not provide a complete representation of human personality or be fully applicable across cultures. Indeed, there are alternative models of personality; however, these are often variations of the Big Five model with a narrower or broader set of dimensions (e.g., the HEXACO model; Ashton & Lee, 2008). While we chose the Big Five personality dimensions to allow for comparability with previous studies, additional traits are likely to improve our understanding of IPCs, as was the case with the disintegration trait. Relatedly, despite relying on existing measures of the Big Five traits, validated also in Slovenia (see Bartol et al., 2023), several items had to be dropped because of high cross-loadings. While this was done to ensure that factors were distinct, internally consistent, and had a clear interpretation, it nevertheless decreased content validity, as a smaller set of the content domain was captured. Future research could adopt more comprehensive scales to better capture individuals' personality traits and their influence on IPCs.

Finally, the moderating effect of having experienced privacy violations in the past was tested using a cross-sectional, non-experimental research design based on self-reports. Although this provides an indication regarding the association between neuroticism and disintegration with the two types of IPCs among different groups of internet users, it does not confirm that privacy violation experiences are the causes of these differences. Therefore, building on the findings of this study, future research could experimentally test whether experiencing privacy violations changes the way in which people evaluate their IPCs.

Conclusion

In this study, we addressed two gaps in the literature on personality and IPCs among internet users. While previous research focused on associations between personality and vertical IPCs, we also investigated horizontal IPCs. In doing so, we identified important differences in the associations between personality traits and different types of IPCs, which suggest that current understanding of individuals' privacy on the internet could be enhanced by a differentiated approach to IPCs. Moreover, we also examined the role of the disintegration trait—individual's tendency to perceive connections among unrelated phenomena—and found that it was an important predictor especially of horizontal IPCs. Overall, this study highlights that individuals engage in nuanced assessments of privacy threats which are, in part, guided by their psychotic tendencies. Online service providers and policymakers should take this into account and ensure that internet users can make informed decisions about their privacy. This would foster trust and help individuals engage in optimal levels of privacy protection, enabling them to reap the benefits of internet use while avoiding its dangers.

Conflict of Interest

The authors have no conflicts of interest to declare.

Use of AI Services

The authors declare they have not used any AI services to generate or edit any part of the manuscript or data.

Authors' Contribution

Jošt Bartol: conceptualization, data curation, formal analysis, methodology, validation, visualization, writing—original draft, writing—review & editing. **Michael Bošnjak**: conceptualization, methodology, writing—review & editing. **Vasja Vehovar**: funding acquisition, methodology, project administration, writing—review & editing. **Gregor Čehovin**: methodology, funding acquisition, writing—review & editing. **Andraž Petrovčič**: conceptualization, methodology, writing—review & editing.

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Appendices

Appendix A

Table A1. *Descriptive Statistics for the Items.*

Item	Item text	*N*	*M*	*SD*	Skew	Kurtosis
Openness [a]						
O1	I have a vivid imagination.*	796	3.09	1.03	−0.01	−0.58
O2	I'm not interested in abstract ideas. (R)	796	3.17	1.00	0.03	−0.60
O3	I have difficulty understanding abstract ideas. (R)	796	3.34	0.96	−0.04	−0.63
O4	I do not have a good imagination. (R)*	795	3.63	0.99	−0.35	−0.50
Conscientiousness [a]						
C1	I get chores done right away.	796	3.49	0.88	−0.44	−0.20
C2	I often forget to put things back in their proper place. (R)	796	3.60	1.01	−0.57	−0.39
C3	I like order.	797	4.02	0.72	−0.82	1.78
C4	I make a mess of things. (R)	796	4.22	0.81	−1.16	1.84
Extraversion [a]						
E1	I'm the life of the party.	797	2.56	0.96	0.21	−0.39
E2	I don't talk a lot. (R)	796	3.21	1.00	−0.02	−0.73
E3	I talk to a lot of different people at parties.	796	3.20	1.00	−0.29	−0.58
E4	I keep in the background. (R)	797	2.93	0.93	0.19	−0.49
Agreeableness [a]						
A1	I sympathize with others' feelings.	796	4.05	0.69	−0.83	2.15
A2	I'm not interested in other people's problems. (R)*	794	3.38	1.00	−0.34	−0.43
A3	I feel others' emotions.	795	3.73	0.76	−0.72	0.82
A4	I'm not really interested in others. (R)*	795	3.22	0.98	−0.07	−0.73
Neuroticism [a]						
N1	I have frequent mood swings.*	797	2.67	0.98	0.35	−0.61
N2	I'm relaxed most of the time. (R)	797	2.51	0.86	0.70	0.12
N3	I get upset easily.*	796	2.67	1.00	0.20	−0.62
N4	I seldom feel blue. (R)	797	2.80	0.94	0.46	−0.37
Disintegration [a]						
D1	People speak ill of me.*	795	2.15	0.71	0.50	0.79
D2	I feel the presence of evil forces around me, although I can't see them.	796	1.96	0.93	0.85	0.13
D3	Sometimes I have an impression that my feelings are frozen.	795	2.19	0.96	0.70	−0.06
D4	I frequently repeat useless actions.	794	2.18	0.95	0.69	0.02
D5	Sometimes I feel as a split personality.	793	2.00	0.98	0.93	0.23
D6	I often wish I were dead and far away from everything.	796	1.64	0.88	1.59	2.49
D7	Sometimes my body, or a part of my body, becomes insensitive and numb.	796	1.74	0.87	1.27	1.49
D8	I feel that everything around me is unreal.	794	1.65	0.82	1.41	2.14
D9	Sometimes thoughts and pictures come to me all by themselves.	796	2.51	1.19	0.18	−1.22
D10	I often feel happy but also irritable at the same time.	794	2.67	1.02	0.00	−0.84
Vertical internet privacy concerns [b]						
VIPC1	I am concerned that companies can misuse my personal information that I share on the internet.	787	5.16	1.55	−0.87	0.05
VIPC2	I am concerned about sharing my personal information on the internet, because I don't know what companies might do with it.	787	5.20	1.56	−0.93	0.16
VIPC3	I am concerned about sharing my personal information on the internet, because companies could use it in unforeseen ways.	787	5.12	1.57	−0.88	−0.01

VIPC4	I am concerned about sharing my personal information on the internet, because companies may share it with others whom I did not intend.	787	5.19	1.57	−0.92	0.05
VIPC5	I am concerned about my sharing personal information on the internet as companies could misinterpret it.	785	4.81	1.62	−0.58	−0.53
Horizontal internet privacy concerns [b]						
HIPC1	I am concerned that my acquaintances can misuse my personal information that I share on the internet.	783	4.20	1.83	−0.15	−1.19
HIPC2	I am concerned about sharing my information over the internet with acquaintances because I don't know what they might do with it.	782	4.37	1.81	−0.29	−1.10
HIPC3	I am concerned about sharing my information over the internet with acquaintances because they could use it in unforeseen ways.	780	4.29	1.82	−0.24	−1.14
HIPC4	I am concerned about sharing my information over the internet with acquaintances as they may share it with others whom I did not intend.	783	4.47	1.78	−0.37	−0.96
HIPC5	I am concerned about sharing my information over the internet with my acquaintances as they could misinterpret it.	783	4.23	1.78	−0.20	−1.11
Previous privacy violation [a]						
PPV	How often, if at all, have you personally been the victim of what you felt was an improper invasion of your privacy on the internet?	786	1.57	0.81	1.41	1.70

Note. M = mean; *SD* = standard deviation; (R) = reverse-coded item. [*]Item removed from the analysis. [a] Response scale 1–5. [b] Response scale 1–7.

Appendix B

Table B1. *Results of Exploratory Factor Analysis.*

Item	O	C	E	A	N	D	VIPC	HIPC
O2	**.73**	−.02	.05	.07	.04	.08	.02	−.02
O3	**.77**	−.01	−.01	.03	−.06	−.03	.02	.00
C1	−.04	**.60**	.02	.05	−.15	.13	−.03	.09
C2	.05	**.74**	.03	−.15	.05	−.05	.02	−.02
C3	−.05	**.65**	.00	.05	.03	.10	.01	−.05
C4	.03	**.53**	−.09	.05	.09	−.17	.03	−.06
E1	−.02	−.12	**.64**	.07	−.13	.16	.04	.00
E2	.04	.03	**.79**	−.07	.18	−.07	.03	−.08
E3	−.04	.02	**.59**	.09	−.13	.04	−.03	.04
E4	.06	.03	**.67**	−.10	.09	−.12	−.04	.02
A1	−.02	.03	−.01	**.68**	.10	−.11	.02	−.03
A3	.10	−.03	−.03	**.76**	−.02	.03	−.05	.03
N2	−.01	−.05	−.05	−.02	**.57**	.11	.00	.02
N4	.00	.05	.07	.07	**.70**	.04	−.03	.07
D2	.00	.09	.06	.01	−.04	**.60**	−.05	.08
D3	.03	.00	−.09	−.10	−.05	**.70**	−.01	−.02
D4	−.05	−.20	−.02	.02	.12	**.54**	.04	−.07
D5	−.09	−.08	.02	−.01	.11	**.67**	.01	−.01
D6	.10	−.02	−.10	−.02	.11	**.67**	−.03	.01
D7	.05	.02	−.01	−.06	−.07	**.79**	−.04	.03
D8	.10	.07	−.01	−.07	.00	**.85**	−.10	.05
D9	.02	.02	.01	.04	−.02	**.62**	.09	−.07
D10	−.10	.07	.06	.09	.06	**.55**	.06	−.05
VIPC1	.00	−.01	.02	−.01	.01	.00	**.88**	.02
VIPC2	.00	.01	−.01	.02	−.03	.00	**.85**	.02
VIPC3	.04	.00	.00	−.03	.00	.00	**.90**	−.01
VIPC4	.01	.01	.00	−.01	.00	−.02	**.91**	−.01
VIPC5	−.01	.02	−.01	−.01	−.04	.03	**.74**	.12
HIPC1	−.03	−.02	.00	.00	.03	−.01	−.01	**.91**
HIPC2	.02	−.01	−.02	−.01	.02	−.01	.04	**.91**
HIPC3	.00	−.02	−.03	.01	.00	.00	.00	**.92**
HIPC4	−.01	−.02	.01	.00	.07	−.03	.03	**.87**
HIPC5	.00	.03	.01	.01	.03	.00	.07	**.84**
Eigenvalue	1.19	1.70	1.86	1.12	1.01	4.24	3.82	4.11
Variance explained	4%	5%	6%	3%	3%	13%	12%	12%
Cronbach's alpha	.72	.71	.76	.67	.61	.88	.94	.96

Note. N = 797. Principal axis factoring with promax rotation. Pairwise deletion used to deal with missing values. O = openness; C = conscientiousness; E = extraversion; A = agreeableness; N = neuroticism; D = disintegration; VIPC = vertical internet privacy concerns; HIPC = horizontal internet privacy concerns.

Appendix C

Table C1. *Results of Confirmatory Factor Analysis.*

Item	Standardized loading	Composite reliability	Average variance extracted
Openness			
O2	.66	.73	.57
O3	.85		
Conscientiousness			
C1	.56	.72	.40
C2	.70		
C3	.61		
C4	.60		
Extraversion			
E1	.65	.76	.44
E2	.71		
E3	.65		
E4	.64		
Agreeableness			
A1	.85	.68	.52
A3	.60		
Neuroticism			
N2	.78	.62	.45
N4	.56		
Disintegration			
D2	.55	.87	.44
D3	.68		
D4	.65		
D5	.76		
D6	.73		
D7	.77		
D8	.82		
D9	.57		
D10	.53		
Vertical internet privacy concerns			
VIPC1	.89	.94	.76
VIPC2	.88		
VIPC3	.88		
VIPC4	.89		
VIPC5	.81		
Horizontal internet privacy concerns			
HIPC1	.90	.96	.81
HIPC2	.93		
HIPC3	.92		
HIPC4	.88		
HIPC5	.88		

Note. N = 797. Robust maximum likelihood estimator (MLR) with full information maximum likelihood (FIML). Model fit: $\chi^2_{(df)} = 1150.954_{(467)}$, $p < .001$, CFI = .942, RMSEA = .047, 90% CI [.043–.050], SRMR = .049.

Appendix D

Table D1. *Results of Path Analysis With Only Big Five Personality Traits as Predictors of IPCs.*

Path	Estimate	Standard error	*p*	Standardized estimate
Openness → Vertical IPCs	−0.026	0.064	.679	−.016
Openness → Horizontal IPCs	−0.243	0.076	.001	−.126
Conscientiousness → Vertical IPCs	0.010	0.087	.904	.005
Conscientiousness → Horizontal IPCs	0.022	0.097	.817	.008
Extraversion → Vertical IPCs	0.002	0.069	.972	.001
Extraversion → Horizontal IPCs	0.133	0.084	.113	.059
Agreeableness → Vertical IPCs	0.402	0.092	< .001	.180
Agreeableness → Horizontal IPCs	0.096	0.104	.355	.036
Neuroticism → Vertical IPCs	−0.015	0.073	.836	−.008
Neuroticism → Horizontal IPCs	0.133	0.086	.123	.061
Gender → Vertical IPCs	−0.063	0.103	.540	−.022
Gender → Horizontal IPCs	0.018	0.123	.883	.005
Age → Vertical IPCs	0.011	0.003	< .001	.136
Age → Horizontal IPCs	0.010	0.004	.010	.099

Note. N = 797. IPCs = internet privacy concerns. Vertical IPCs R^2 = 4.7%. Horizontal IPCs R^2 = 3.3%.

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