Anxiously attached: Personality predictors of privacy attitudes, trust, and willingness to share information on the internet

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Privacy concerns surrounding Internet and technology use are higher now than ever, yet, people continue to use the Internet and Internet-connected technologies to share information without coercion and often with recipients they do not have a relationship with. Our research addresses how people's personality, particularly two personality dimensions (anxiety and avoidance) together known as attachment style, affects their self-reported willingness to share and their actual sharing behavior. We conducted two studies on Amazon's Mechanical Turk (N=984). Study 1 surveyed 500 participants (193 women, 304 men, 3 transgender) aged 20-79 (Mdn = 35, SD = 11.65); and Study 2 surveyed 484 participants (223 women, 260 men, 1 transgender) aged 19-78 (Mdn = 35; SD = 11.69). Multiple regression analyses controlling for demographics and the personality factors neuroticism and extraversion show that anxiously attached individuals are more concerned (βs = .24 and .33) than less anxiously attached individuals about their private data being disclosed, yet paradoxically, they report more trust in the security of digital communications (βs = .21 and .34), making them more likely to share personal information on the Internet (βs = .26 and .22). This research bears theoretical implications (e.g., understanding the psychology of sharing behavior), as well as practical ones (e.g., for tailoring existing privacy and sharing controls to individuals based on their personality characteristics).

Keywords: attachment style, anxiously attached, sharing attitudes, sharing behavior, internet, privacy, trust

Despite the popularity and advancement of Internet-connected technologies, privacy concerns surrounding technology use are high (Madden, 2014; Olmstead & Smith, 2017; Perrin, 2018; Turow et al., 2018). This may be due to the ability of ever advancing communication technologies to collect personal information about its users and share it a variety of ways (see, for example, Schomakers et al., 2020). There are two main ways in which information is collected and shared over the Internet. First, people provide information *directly* on websites and applications or via Internet-connected devices. For example, people provide their personally identifying information (e.g., name, birth date, email address, phone number, and so on) to obtain services on the Internet. They also share personal views, photos, and videos via social media applications with friends, family, and acquaintances. Second, information is collected *indirectly* from people to provide better service. For example, ads are generated using information provided by people on websites and Internet-connected applications. The resulting concerns may stem from a sense of loss of control over personal information when disclosure does not meet people's expectations for privacy (Trepte et al., 2020; Turow et al., 2018).

Most recently, people's privacy concerns have been evidenced in backlash directed at particular smartphone applications and their release of personal information for the purpose of COVID-19 contact tracing (Altmann et al., 2020; Guillon & Kergall, 2020; Neyaz et al., 2020; Zhang et al., 2020). Yet, despite these apparent and often public concerns, many people continue to share personal and private information over the Internet and it is often unclear what motivates them to do so (Yua et al., 2020).

To further understand these motivations, we investigated individual differences in privacy concerns, trust in Internet security, and sharing behavior (i.e., actually providing personal information) that occurs through the use of Internet applications. We examine two personality dimensions (anxiety and avoidance), together known as "attachment style." Attachment style reflects an individual's characteristic behavior in close relationships (see Mikulincer & Shaver, 2007, for a comprehensive review). Attachment style is mostly studied in the context of close personal relationships, but it also predicts different ways of interacting with acquaintances and strangers and the extent of self-disclosure (Feeney et al., 2008; Roisman et al., 2006). Attachment style has also been found to shape Internet sharing behavior (Hart et al., 2015). However, there is still much to learn about how attachment style shapes the privacy concerns, trust, and practices connected to these activities.

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To address this gap, we sought answers to the following three questions. (1) How does attachment relate to people's perceptions of security and privacy on the Internet, specifically, their feelings of security about sharing personal information with strangers? (2) How does attachment relate to people's attitudes about sharing personal information with strangers over the Internet? (3) How does attachment relate to people's actual sharing behavior, when sharing with strangers over the Internet? Across all three questions, we focus specifically on people's attitudes towards sharing personally identifying information with strangers over the Internet and their actual behavior when sharing this information.

Privacy attitudes and trust in Internet communications

A widely accepted definition of privacy is having control over the flow of information, i.e., how it is collected, stored, disclosed, and used (Moore, 2008, 2021; Westin, 1967). To develop better privacy controls for Internet applications, researchers have studied how individuals share their personal information with close acquaintances and with unknown people and organizations, and have identified several factors that shape privacy attitudes and willingness to share information online (see, for example, Boyd, 2014; Prasad et al., 2012). People's willingness to share information with others over the internet depends on a variety of factors. Willingness to share information may depend on the *context* in which the information is collected (Nissenbaum, 2010) including risk perceptions and the recipients with whom the information is being shared (Consolvo et al., 2005; Coventry et al., 2014; Hoyle et al., 2020; Prasad et al., 2012; Zheng et al., 2018). For example, in a study of workers' willingness to share location information online, Consolvo et al. (2005) discovered that participants did not want their managers and bosses to know their location when it was irrelevant to their work.

Willingness to share information online may also be shaped by the *sensitivity* of data being shared (Ponciano et al., 2017; Prasad et al., 2012). For example, in one study which explored sharing fitness information online, Prasad et al. (2012) found that people considered weight to be more sensitive than the number of steps they had taken in a day and were therefore more likely to share their number of steps than their weight with others. Other studies have found that people are also less likely to share sensitive information if they are aware of or had experienced an unintended information disclosure (Prasad et al., 2019; Rieger et al., 2019). For example, Rieger et al. (2019) found that knowledge about Facebook's Cambridge Analytica privacy breach made individuals more concerned about researchers collecting their passive smartphone data and more hesitant to share personal information online.

Additionally, *demographic information* such as age, gender, and race also affect privacy attitudes and willingness to share information online (Boyd, 2014; Dev et al., 2020; Quercia et al., 2012; Wang et al., 2011; Youn & Hall, 2008). For example, Quercia et al. (2012) discovered that men and women share similar amounts of private information on Facebook, but men tend to share more information beyond their social circles. Moreover, trust in Internet-connected devices and applications is also influenced by one's technical capabilities and the experience of the user that are often influenced by one's age (Brecht et al., 2012; Frik et al., 2019). For example, Frik et al. (2019) discovered that older adults were less likely to trust and use the Internet because of their limited technical expertise and increased vulnerability to security threats.

Role of personality traits

Personality traits also have been found to shape internet sharing behavior and perceptions of online privacy and trust. Most prior work in this area has focused on understanding the role of the "Big Five" personality trait dimensions. These dimensions include neuroticism (sensitive/nervous vs resilient/confident), extraversion (outgoing/energetic vs. solitary/reserved), intellect/openness to experience (inventive/curious vs. consistent/cautious), agreeableness (friendly/compassionate vs. challenging/callous) and conscientiousness (efficient/organized vs. extravagant/careless) (Gosling et al., 2003; McCrae, 1992).

Neurotic and extraverted individuals, compared to those lower in neuroticism and extraversion, tend to use the internet and social media sites more than others and are more likely to experience "addiction" (Blackwell et al., 2017; Marengo et al., 2020). Some data suggest that people higher in neuroticism are more trusting of the Internet, and thus more vulnerable to security threats including phishing (Halevi et al., 2013; Quercia et al., 2012; Woszczynski et al., 2002). However, other studies of neuroticism did not find that it predicted the posting of personally identifying information in particular, such as mailing address or phone number (Ross et al., 2009).

Perhaps ironically, extraverts tend to be more privacy conscious when online (Quercia et al., 2012) but are also found to be more active users on social media sites such as Facebook (logging in more, updating status, and posting information; Michikyan et al., 2014). Consequently, people with more friends (in the high extraversion group) are found to disclose more information to people they already know in online communities (Schrammel et al., 2009).

More agreeable individuals care about what others would think of them and are also more likely to be concerned about their privacy when using the internet (Brecht et al., 2012). Halevi et al. (2013) studied the role of personality traits in sharing behavior on social media and discovered that people who exhibited more openness share more and have less restrictive privacy settings on Facebook. Personality traits also impact people's perception of data sensitivity, where emotional stability decreases this sensitivity while conscientiousness increases it (Bansal et al., 2010).

Attachment

The five-factor personality model is a comprehensive taxonomy capturing most trait-descriptive words in a language in five underlying dimensions. Besides a relatively small set of trait terms that represent the semantics typical of those dimensions, the taxonomy represents blends of (usually two) of the dimensions, which forms the largest set of terms. The dimensions and their blends summarize the many ways in which people tend to talk about people. However, the ways in which the Big Five dimensions and their facets are

generally formulated do not necessarily coincide with specific theory-based trait dimensions that personality researchers consider to be important, especially when studying how personality relates to a particular behavioral domain. Ideally, such specific dimensions or constructs would find a niche of connection in that Big Five system. Attachment style is such a personality construct that cannot be simply reduced to the Big Five and may predict certain outcomes better than the Big Five dimensions (Noftle & Shaver, 2006), including online behavior (Hart et al., 2015).

Attachment styles, or orientations, describe individual differences in the attachment system, a species-characteristic behavioral system that helps to regulate close personal relationships across the lifespan (Mikulincer & Shaver, 2017). Generally speaking, the system supposedly modulates the maintenance of physical proximity to and psychological intimacy with loved ones. Part of this process involves monitoring whether relationship partners are available, responsive, and trustworthy, especially during real or expected experiences with distress. Individual differences in attachment system functioning –"attachment style"– can be characterized as a product of one's "low" or "high" standing on two partially independent dimensions, "anxiety" and "avoidance" (Mikulincer & Nachshon, 1991; Mikulincer & Shaver, 2017). Individuals develop anxiety and/or avoidance in order to manage chronic concerns about interpersonal loss, rejection, or abandonment. Attachment anxiety reflects relatively high interpersonal concerns and leads to reassurance-seeking behaviors and heavy monitoring of relationship status, whether one is loved, and so on. By contrast, attachment avoidance reflects an emotion-regulation strategy whereby more avoidant individuals seek to suppress their attachment needs to prevent being "hurt" by others. Interestingly, measures of anxiety and avoidance are moderately positively correlated, suggesting that "insecure" people sometimes toggle between the two tendencies, depending on whether they believe that their attempts to obtain intimacy are likely to be successful in a given moment or relationship (Mikulincer & Shaver, 2017).

Attachment styles are influential across a range of intrapersonal and interpersonal contexts, in which anxious attachment predisposes individuals to strive to earn others' affection while avoidance predisposes individuals to try to suppress relational needs. By contrast, "secure" attachment is defined by low anxiety and low avoidance, reflecting comfort with both intimacy and independence (Mikulincer & Nachshon, 1991). Anxiously attached individuals tend to disclose information about themselves at relatively high levels in social interactions, perhaps as a way to establish an intimate feeling while avoidant individuals have the opposite tendency.

Given that attachment style reflects fundamental social motivations (i.e., for closeness, intimacy, and positive regard from others), as well as feelings about oneself and feelings about the trustworthiness of others, it seems a likely candidate to explain socially relevant aspects of technology use, including social media behavior, privacy attitudes and willingness to share information with others online. For example, attachment has been used to understand excessive smartphone use. Those higher in attachment anxiety tend to use these technologies to keep in constant contact with others they know and as a way to seek "refuge" in the feeling

of safety offered by being connected to one's device and, subsequently, others (Konok et al., 2016; Trub & Barbot, 2016). Additionally, people higher in attachment anxiety reported being relatively active on Facebook and are likely to share more information with family, friends and acquaintances, whereas higher avoidance is associated with relatively low activity and sharing (Hart et al., 2015).

Although most attachment research focuses on *close* interpersonal relationships, it is also true that attachment styles influence people's orientation toward and behavior in relationships with acquaintances and strangers (Feeney et al., 2008). However, no studies have yet explored the effect of attachment style when individuals share information with recipients on the Internet with whom they do not have a personal relationship. Sharing information with others includes answering surveys for strangers, signing up for services by providing data manually, or sharing data collected automatically by software. Germane to the present research, in the sense of linking attachment and self-disclosure tendencies, evidence suggests that anxiously attached individuals disclose more information about themselves in social interactions, perhaps as a way to "break the ice" or establish an intimate feeling; avoidant individuals have the opposite tendency (Mikulincer & Nachshon, 1991). At first blush, anxious individuals' tendency to self-disclose may seem surprising because anxiously attached individuals have lower self-esteem and are sensitive to rejection and might therefore be expected to avoid disclosing personal information that could lead to being judged negatively or rejected. However, it may be that they self-disclose somewhat compulsively and despite their fears, because they crave a sense of connection to (and positive feedback from) others. Indeed, anxiously attached individuals have a greater "fear of missing out" (i.e., on rewarding social interactions), which disposes them to social media "addiction" (Blackwell et al., 2017).

Hypotheses

Theory and research on personality traits in general, and attachment style differences in particular, led us to form the following four hypotheses concerning privacy perceptions and disclosure of personal information online:

1. Anxiously attached individuals are less concerned about privacy as they seek to make connections with others.
2. Anxiously attached individuals are more likely to disclose personal information in digital and online contexts.
3. Avoidantly attached individuals are more concerned about privacy.
4. Avoidantly attached individuals are more likely to withhold information.

METHOD

We conducted two studies, both reviewed and approved by the Institutional Review Board at the first author's institution. The two studies, reported here in separate sections (Study 1: Sharing attitudes, and Study 2: Sharing behavior) made use of online surveys through Amazon's Mechanical Turk crowdsourcing marketplace (MTurk). The MTurk

platform has been shown to be a credible source for obtaining reliable social science survey data (Buhrmester et al., 2011; Casler et al., 2013; Landers & Behrend, 2015), including for privacy research (Redmiles et al., 2019) and offers a more diverse sample compared to standard Internet and college sampling (Buhrmester et al., 2011). To ensure high data quality, we set restrictions to only include MTurk workers with a strong performance record, i.e., above 98% approval ratings, and moderate productivity, i.e., with an HIT (Mturk "Human Intelligence Task" participant rating score) above 100 (Peer et al., 2013). To further reassure the validity of MTurk responses, we included attention check questions throughout each survey (Hauser & Schwarz, 2016).

Research design, participants, and procedures

For the two studies together, we recruited a convenience sample of *N*=984 participants. Participants were located in the United States and were paid $2 each on completion of the survey. In both surveys we collected demographic information (participant's gender, age, race, education, and marital status). We used attention check questions as a way to exclude bots, and since all our participants answered these questions correctly, we did not eliminate any responses.

For Study 1 (sharing attitudes), we surveyed a total of 500 participants (193 women, 304 men, 3 transgender) aged 20-79 (*Mdn* = 35, *SD* = 11.65). For Study 2 (sharing behavior), we surveyed 484 participants (223 women, 260 men, 1 transgender) aged 19-78 (*Mdn* = 35; *SD* = 11.69). We ensured there was no overlap in participants across the two studies. The surveys took approximately 10-15 minutes to complete.

Measures

In both surveys we used modified versions of validated questionnaires measuring *security and privacy attitudes*, *attachment and personal relationships*, and *personality*. In addition, for Study 1, information was collected on *sharing attitudes*, and, for Study 2, information was collected *on sharing behavior*. All questionnaires were assessed on a 7-point-Likert scale.

Security and privacy attitudes. For both studies, we used a modified version of the Pew Research Center's Internet Project/GFK Privacy Panel Survey. Researchers at the Pew Research Center developed this survey to understand Americans' privacy concerns regarding surveillance, tracking, and profiling in the post-Snowden era (Madden, 2014). In our survey, we included questions from the Pew questionnaire that helped us capture some of the different ways people share information over the Internet and the different types of information that they share.

Specifically, we included Q7 from the original Pew Questionnaire, which includes questions assessing participants' trust or feelings of security when sharing private information over landline telephone, cellphone, text messages, email, messaging applications, and social media sites or apps. We also included a slightly-modified version of Q8 from the original Pew Questionnaire, which includes ques-

tions assessing participants' privacy attitudes when sharing information about themselves, such as their purchasing habits, location history, physical and mental health, medications, religious and political views, their taste in music, movies or books, relationship history, call, text, browser or online search history, contents of email and text messages or phone conversations, birth date, social security number, and information about their friends and family. The original question asked participants to rate the sensitivity of the information. We rephrased it to ask how concerned participants might be about sharing the information. We used the questions to create two different outcome variables.

Attachment and close relationships scale. For both studies, we used a 36-item questionnaire called the Experiences in Close Relationships (ECR) scale to determine the participants' feelings about and behavior in close relationships (Brennan et al., 1998). Half of the items measure attachment anxiety (e.g., "I worry a lot about my relationships") and the other half measure avoidance (e.g., "I try to avoid getting too close to others").

Personality measures. For both studies, we also used a modified version of the Big Five Inventory called the ten item personality inventory (TIPI) to measure the Big Five traits (Gosling et al., 2003). We only included the neuroticism and extraversion scores in our analyses, in order to control for possible overlap with attachment anxiety (which is correlated with neuroticism) and avoidance (which is negatively related to extraversion).

Sharing attitudes. In Study 1 (Sharing attitudes) we included multiple questions to aggregate into sharing attitude variable. However, among the types of information people provide when signing up for online services, we restricted the types of information to only those considered most sensitive, including people's names and their address (as both could be used to identify them) and their political views. We asked participants how willing they were to share the following information with us: their full name, state and city they live in, their mailing address, birthday, phone number, email address, political affiliation, and who they voted for in the last presidential election. Each item was assessed separately. We selected the types of information people often provide when signing up for online accounts.

Sharing behavior. In Study 2 (Sharing behavior), we included multiple questions to aggregate into a behavioral outcome variable. Instead of simply asking participants if they were willing to share personal information (as we did in Study 1), in Study 2, we asked participants to actually provide their personal information. We quantified the participants' sharing behavior by providing one point per piece of information provided. For example, when asked to enter their full name, a participant received two points for providing their first and last name, one point for providing only their first name and zero for all other responses including no response, a whitespace, or an irrelevant response such as "not gonna tell you." For other items such as state or city, a participant received one point for a relevant answer and zero for all other responses including not providing any answer or entering an incorrect answer, such as providing the name of a country as a response to the question about state and the name of the state as a response to the question about city.

Table 1. Correlation matrix for Study 1: Sharing attitude's main variables

	Anxiety	Avoidance	Disclosure	Secure	Concern	Extraversion	Neuroticism	Age
Anxiety (18 items)								
Avoidance (18 items)	.496**							
Disclosure (10 items)	.168**	.072						
Secure (6 items)	.216**	.039	.421**					
Concern (18 items)	.239**	.080	-.086	-.026				
Extraversion (2 items)	-.012	-.110*	.036	.111*	.054			
Neuroticism (2 items)	.484**	.304**	.002	-.060	.060	-.239**		
Age (1 item)	-.229**	-.176**	.003	-.041	.114*	.072	-.192**	
Gender (1 item)	-.055	-.120**	-.160**	-.041	.095*	-.015	.167**	.111*

Note: ** Correlation is significant at the 0.01 level (2-Tailed); * Correlation is significant at the 0.05 level (2-Tailed)

We considered a response to be incorrect (and assigned it a value of 0) if it did not answer the question, for example, providing the state instead of city for the question about the city. Obviously, we have no way to verify whether the answers provided by participants were accurate, which is the risk for studies that involve self-reported data. However, since the survey emphasized that providing the information was optional, there was no incentive for participants to give false information (or any information).

The personal information provided by the participants was automatically saved by the survey platform Qualtrics; however, after recording whether or not they provided information to the questions, we deleted the pertaining input.

Analysis

We conducted multiple regression analyses to assess the unique effects of attachment anxiety and avoidance on the following items:

1) trust or feelings of security about sharing private data (secure),
2) concern about the leaking of private information (concern), and
3) self-reported willingness to disclose private information in online surveys (disclosure).

The first two assessments (secure and concern) were used to test Hypotheses 1 and 3, and the last assessment (disclosure) was used to test Hypotheses 2 and 4.

In all cases, we controlled for neuroticism and extraversion, as well as for age and gender, so that we could discern the unique effects of attachment and rule out third-variable explanations involving those other factors.

RESULTS

Study 1: Sharing attitudes

The alpha reliability coefficients for the different variables are as follows: anxiety (α = .96), avoidance (α = .95), secure (α= .88), concern (α = .92), extraversion (α = .71), neuroticism (α = .72), disclosure (α = .80). The correlation matrix

for Study 1 is presented in Table 1. See Table 2 for the full regression results.

Trust or feelings of security (secure). Consistent with Hypothesis 1, Anxiously attached individuals reported feeling more secure about their private data and communications, β = .21, p < .001. The same was true, marginally, for people higher in extraversion, β = .09, p = .08. Avoidantly attached individuals tended to report feeling less secure, β = -.08, p =.10.

Privacy concerns (concern). Contrary to Hypothesis 1, anxiously attached individuals reported feeling more concerned if their private information would be disclosed or leaked, β = .24, p < .001, as did older adults, β = .11, p = .02. Inconsistent with Hypothesis 2, avoidance was not associated with concerns about the leaking or disclosure of private information.

Table 2: Regression results for Study 1

	b	SE	β
Secure			
Anxiety	.221	.057	.214***
Avoidance	-.090	.054	-.083
Extraversion	.074	.042	.087
Neuroticism	-.082	.055	-.087
sex	.072	.140	.024
age	-.005	.006	-.040
Concern			
Anxiety	.165	.038	-.240***
Avoidance	-.019	.036	-.026
Extraversion	.023	.028	.040
Neuroticism	-.023	.036	-.036
sex	.052	.093	.026
age	.010	.004	.113*
Disclosure			
Anxiety	.036	.008	.256***
Avoidance	.001	.007	.004
Extraversion	.001	.006	.011
Neuroticism	-.021	.007	-.161**
sex	.012	.019	.028
age	.003	.001	.156***

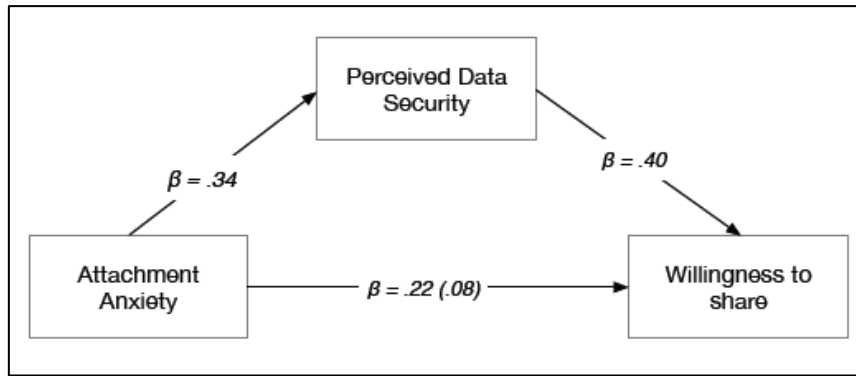*Note: *p < .05; **p < .01; ***p < .001*

Figure 1. Mediation model for Study 1: Sharing attitudes

Sharing attitudes (disclosure). Consistent with Hypothesis 2, anxiously attached individuals reported being more likely to provide private information in a survey, $\beta = .26$, $p < .001$, as did older adults, $\beta = .16$, $p = .001$. Individuals higher in neuroticism reported the opposite, $\beta = -.16$, $p = .005$. Inconsistent with Hypothesis 4, avoidance was not associated with likelihood of providing private information.

Exploratory mediation analysis. To assess whether their greater sense of trust in the confidentiality of their private information explains why more anxiously attached people seem more likely to provide it, we also conducted a simple exploratory mediation analysis according to Hayes's (2018, Model 4) guidelines. As shown in Figure 1, which depicts the exploratory mediation analysis results, trust or feelings of data security significantly mediated the effect of attachment anxiety on sharing attitudes and people's willingness to provide private information; the (unstandardized) coefficient for the indirect effect = .003 (CI = .0003 to .0056).

Study 2: Sharing behavior

The alpha reliability coefficients for the different variables are as follows: anxiety ($\alpha = .96$), avoidance ($\alpha = .96$), secure ($\alpha = .90$), concern ($\alpha = .93$), extraversion ($\alpha = .76$), neuroticism ($\alpha = .78$), disclosure ($\alpha = .73$). The correlation matrix for Study 2 is presented in Table 3. See Table 4 for the full regression results.

The findings in Study 2 (sharing behavior) largely replicated Study 1's findings, at least with regard to attachment style. As reported in more detail below, anxiously attached individuals reported feeling more secure about their private data and communications, and more concerned if their private information would be disclosed or leaked, and more likely to provide private information in a survey. As in Study 1, in Study 2 avoidance did not show much predictive power.

Trust or feelings of security (secure). As in Study 1, anxiously attached individuals reported feeling more secure about their private data and communications, $\beta = .34$, $p < .001$. Individuals higher in neuroticism reported feeling less secure, $\beta = -.20$, $p < .001$.

Privacy concerns (concern). As in Study 1, anxiously attached individuals reported feeling more concerned if their private information would be disclosed or leaked, $\beta = .33$, $p < .001$, as did older adults, $\beta = .16$, $p < .001$.

Sharing behavior (disclosure). Consistent with their self-reports in Study 1, in Study 2 anxiously attached individuals actually provided more private information when asked to do so, $\beta = .22$, $p < .001$. Women were somewhat less likely than men to give private information, $\beta = -.15$, $p = .001$.

Mediation analysis. Finally, as seen in Figure 2, and conceptually replicating Study 1's results, anxiously attached individuals' trust or feelings of data "security" significantly mediated the effect of their attachment anxiety on

Table 3. Correlation matrix for Study 2: Sharing behavior's main variables

	Anxiety	Avoidance	Disclosure	Secure	Concern	Extraversion	Neuroticism	Age
Anxiety (18 items)								
Avoidance (18 items)	.386**							
Disclosure (10 items)	.141**	.026						
Secure (6 items)	.136**	-.040	.146**					
Concern (18 items)	.186**	.030	.036	.310**				
Extraversion (2 items)	-.134**	-.209**	.060	.107*	.043			
Neuroticism (2 items)	.494**	.298**	-.060	-.030	.045	-.403**		
Age (1 item)	-.200**	-.148**	.139**	-.040	.085	.141**	-.171**	
Gender (1 item)	-.026	-.070	.018	.002	.034	-.011	.182**	.178**

Note: ** Correlation is significant at the 0.01 level (2-Tailed); * Correlation is significant at the 0.05 level (2-Tailed)

Table 4. Regression results for Study 2

	b	SE	β
Secure			
Anxiety	.296	.048	.343***
Avoidance	-.065	.049	-.067
Extraversion	.048	.035	.062
Neuroticism	-.162	.044	-.195***
Gender	.014	.119	.005
Age	-.002	.005	-.016
Concern			
Anxiety	.257	.043*	-.327***
Avoidance	-.017	.044	-.019
Extraversion	.021	.032	.030
Neuroticism	-.056	.040	-.074
Gender	.254	.107	.106*
Age	.016	.004	.159***
Disclosure			
Anxiety	.162	.042	.217***
Avoidance	-.025	.043	-.030
Extraversion	.013	.031	.019
Neuroticism	-.042	.03	-.059
Gender	-.337	.104	-.148*
Age	.005	.004	.055

Note: $*p < .05$; $**p < .01$; $***p < .001$

their actual sharing behavior or willingness to actually provide private information; the coefficient for the indirect effect = .07 (CI = .03 to .10).

DISCUSSION

Prior studies on privacy have not used attachment theory as a guiding framework to understand individual differences in privacy attitudes and sharing over the Internet. Moreover, prior research on attachment and the internet has focused on how people use social media and smartphones. Here, we discovered that attachment style is related to trust, privacy attitudes, and actual sharing behavior across platforms. In so doing, we show that the explanatory influence of attachment extends beyond obvious social contexts to ones that are merely social by implication (i.e., somebody, somewhere, is learning information about the user's life–an appealing notion for individuals who yearn to make connections). In the context of privacy in technology, this reveals one additional factor—attachment style—that affects people's use of privacy controls.

Findings from our studies also show that neuroticism was associated with less trust. This contradicts prior research that showed people who exhibit high neuroticism are more open and more trusting of the Internet (Halevi et al., 2013; Woszczynski et al., 2002), suggesting that the previous finding for neuroticism may have been due to a suppression effect.

We also think that the unique features of attachment anxiety may explain the privacy paradox found in this study. Attachment theorists originally referred to attachment anxiety as "anxious-ambivalence" due to a tendency for these individuals to both crave intimacy but also to display anger and resentment toward others who did not meet their needs. Ambivalence is also reflected in their tendency to disclose more information about themselves during casual interactions in both non-virtual (Mikulincer & Nachshon, 1991) and online settings (Hart et al., 2015), despite their insecurity and rejection sensitivity. In our studies, we observed another aspect of ambivalence associated with this attachment anxiety. Namely, more anxiously attached individuals reported that they would feel more concerned about their private data being disclosed. Paradoxically, though, they reported more trust (feelings of security) about their digital communications, and because of this, they were more likely to provide researchers (i.e., us) with their personal information. This phenomenon may also be partly explained by their greater need to feel "known" and understood, perhaps because this gives them a sense of intimacy.

Attachment style showed no significant effect on individuals' security attitudes towards different Internet platforms. These results bear implications for how attachment style might relate to sharing behavior and privacy concerns among users of different Internet-connected technologies. Incidentally, the questions about how "secure" people feel on various platforms addressed landline, cell, text, chat, email, and social media. There were no differences based on attachment in level of security across these platforms. Similarly, there were also no differences based on attachment in the level of concerns individuals had about disclosing various sensitive information about them on these platforms.
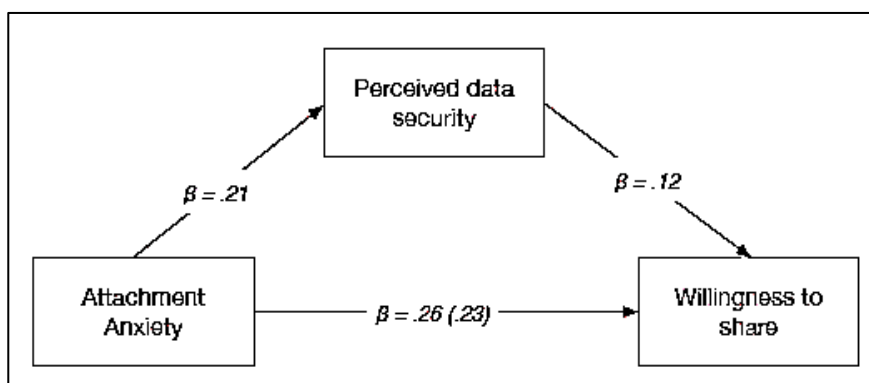

Fig 2. Mediation model for Study 2: Sharing behavior

Implications for practice and future research

Among our findings, our results showed anxiously attached individuals to be more motivated than less anxiously attached individuals to share sensitive information with strangers on the Internet. This has implications for privacy controls. Existing privacy controls often focus on restricting information sharing, for example, by using ad blockers or cookie filters, which may not be appealing to anxiously attached individuals who prefer to share information. Additionally, their inherent feelings of security might prevent them from installing such ad blockers and also lead them to use websites and free smartphone apps that display ads, despite knowing that the websites and smartphone apps may collect information to generate ads. Their trust in technology may also make them early adopters of new technology, especially if the technology provides them a medium to share information with people with whom they crave intimacy. They may also continue to use the technology despite privacy concerns, if the technology helps them feel connected with the recipient. Anxiously attached individuals have been shown to develop emotional connections with the technology itself, which they may anthropomorphize (Bodford et al., 2017; Wang, 2017). For example, more anxiously attached individuals may connect more with smartphones and Internet-connected devices –especially smart assistants such as Google Home, Siri, and Alexa–, than less anxiously attached individuals and share information readily in order to build their relationship.

Given our findings, we expect that anxiously attached individuals will be motivated to use internet connected platforms and technologies, especially if they feel they will be more loved when sharing data collected through these services and devices, despite having privacy concerns about using them. Since anxiously attached people want to share information to feel intimate in a relationship – any relationship, not just close personal ones – and they are inherently trusting of the technology, they may be less likely to use privacy controls that are available to them. Privacy controls are often set up to restrict or moderate the sharing of information, which anxiously attached individuals who want to share information may not find to be useful. Therefore, to build privacy controls to meet the needs of anxiously attached individuals, we need to conduct additional studies to determine the strategies people with attachment anxiety may use when they wish to protect their privacy. Future studies could also explore the effect of attachment anxiety on the privacy paradox. Finally, more research is required to understand whether there are any correlations between attachment anxiety and the known factors that affect people's privacy attitudes and trust such as sensitivity of data, recipients, context in which data was collected, prior negative experiences, and technical capabilities. We expect further research based on attachment theory can help the privacy and technology community better understand the privacy paradox illustrated in this study and ultimately contribute to design recommendations for sharing controls for Internet-connected applications and devices that focus more on sharing information and less on restricting the sharing of information.

Limitations

In our studies, we only focus on Internet users in the United States. Other countries around the globe have similar internet capabilities, use, and services. However, the results of our studies may only give insight into the privacy perceptions, trust, and sharing behavior of people in the United States given the probable social and cultural differences surrounding privacy perceptions, norms, and practices throughout the world. We expect researchers who have the resources to study cross-cultural privacy may be able to use the methods we describe here to determine the role that attachment anxiety plays in privacy attitudes and sharing behavior across cultures.

Conclusions

Our studies add to our understanding of the role that personality traits, particularly attachment, play in shaping privacy concerns, trust, and sharing behavior through Internet applications. We show that more anxiously attached individuals felt more secure than less anxiously attached individuals about their data on the Internet and reported that they would feel more concerned about their private data being disclosed, but paradoxically shared more personal information with us (the researchers) when prompted to do so. Further research on people's levels of attachment style should seek to understand the effectiveness, and predict the adoption of, privacy controls and develop sharing controls that reduce unintended disclosure. Together, this research can help the privacy community further understand the nuances of psychological forces that shape people's online privacy practices and perceptions.

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