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Privacy, Trust and Self-Disclosure to Web-Based Surveys

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Abstract

Despite increased concern about the privacy threat posed by new technology and the Internet, in many environments there is little evidence that people's privacy concerns lead to privacy-protecting behaviours. In the present paper, two studies are presented in which people's privacy concerns are studied in light of their willingness to disclose personal information to web-based surveys. In Study 1, measures of privacy concern are collected, followed six weeks later by a request to complete a web-based survey containing requests for sensitive personal information, alongside measures of trust in the requestor, and perceived privacy related to the specific request (n= 759). Structural equation modelling identified two privacy-related pathways determining self-disclosure: one based on respondents' perceived privacy and trust (a situational pathway), the other respondents' general privacy concerns and privacy-protecting behaviours (a dispositional pathway). In Study 2, privacy and trust were experimentally manipulated, and disclosure to a web-based survey measured. The results indicated that the impact of low privacy on self-disclosure is moderated by trust, such that high trust compensates for low privacy when examining item non-response. Implications for understanding the links between privacy attitudes, design of web-based surveys and item non-response to sensitive items, are discussed.

Keywords

Privacy, trust, web-based surveys, self-disclosure

1. Introduction

Privacy has long been a concern of survey methodologists interested in data integrity and response rates (e.g. Andreasen, 1970). Surveys and research administered via the Internet, rather than using paper methodologies, been associated with reductions in socially desirable responding (Frick, Bächtiger & Reips, 2001; Joinson, 1999), higher levels of self-disclosure (Weisband & Kiesler, 1996) and an increased willingness to answer sensitive questions (see Tourangeau, 2004).

Similarly, survey methodology techniques that reduce human involvement in question administration also tend to increase responses to sensitive personal questions. For instance, compared to other research methods, when data collection is conducted via computer-aided self-interviews people report more health related problems (Epstein, Barker & Kroutil, 2001), more HIV risk behaviours (Des Jarlais, Paone, Milliken, Turner, Miller, Gribble, Shi, Hagan

& Friedman, 1999), more drug use (Lessler, Caspar, Penne & Barker, 2000), and men report less sexual partners, and women more (Tourangeau & Smith, 1996). Medical patients tend to report more symptoms and undesirable behaviours when interviewed by computer rather than FtF (Greist, Klein & VanCura, 1973). Clients at a STD clinic report more sexual partners, more previous visits and more symptoms to a computer than to a doctor (Robinson & West, 1992). Ferriter (1993) found that pre-clinical psychiatric interviews conducted using computer-mediated communication compared to face-to-face yielded more honest, candid answers. Similarly, automated or computerized telephone interviews, compared to other forms of telephone interviewing, lead to higher levels of reporting of sensitive information (see Lau, Tsui & Wang, 2003; Tourangeau, 2004).

There is some evidence that this response pattern might be related to privacy – for instance, Moon (1998) reports that participants are more likely to disclose socially undesirable behaviours to a geographically remote computer compared to one closer to them. Joinson, Woodley and Reips (2007) report that although personalized salutation in e-mail increases response rates to a web-based survey, it also increases item non-response to sensitive questions, implying a privacy cost to personalization (see also Andreasen, 1970 for a mail survey equivalent).

However, the relationship between privacy concerns and actual behaviour is neither straightforward, nor has any link been established incontrovertibly. There is evidence that although many Internet users express privacy-protectionist attitudes, this rarely translates to their actual behaviour (Acquisti & Grossklags, 2003, Jupiter, 2002; Metzger, 2006; Pew Internet and American Life Project, 2000; Spiekermann, Grossklags and Berendt, 2001). Privacy is also a disposition (i.e. an individual's general level of privacy concern) and an interpretation of a specific interaction or situation (i.e. an individual's perceived privacy at any one moment). In the present paper we examine the links between privacy (both dispositional concerns and situational interpretation), trust and self-disclosure to web-based surveys. Uniquely, self-disclosure is behaviourally measured, and we utilise both survey-based and experimental methods. In Study 1, measures of dispositional privacy, perceived privacy and trust are modelled in light of disclosure behaviour to a web-based survey. In Study 2, privacy and trust are experimentally manipulated, and the impact on disclosure to a survey examined.

2. Study 1

Method

Participants

Participants were 759 members of an online research panel of Open University (OU) students called 'PRESTO'. The OU is an adult distance learning institution with nearly all students studying part time from home or work. PRESTO members are recruited annually and commit to completing six online surveys over 12 months. The sample is selected using stratified sampling, and is broadly representative of the whole student population (e.g. by age, gender and discipline and geographic location). Of the 759 respondents, 64% (487) were female, 36% (272) were male. The mean age of the sample was 42.58 years, (range=17–84 years, *SD*=11.11).

Materials

Time 1: Privacy dispositions

A set of 16 privacy attitude items and 12 reported privacy behaviour items developed by Buchanan, *et al*. (2007) was given to participants. For all privacy items, responses were made on a 5-point scale (anchored at 'very concerned' and 'not at all concerned'). The privacy behaviour items consisted of six 'general caution' items (e.g. reading privacy policies, license agreements etc.) and six 'technical protection' items (e.g. removing cookies, clearing internet browser history regularly etc.; both anchored at 'always' and 'never'). The privacy concern items covered a variety of Internet-related privacy concerns (e.g. 'Are you concerned about online organisations not being who they claim they are? 'Are you concerned that an email you send someone may be inappropriately forwarded to others?'). Participants were also asked about their Internet use (history, breadth of use, and time spent online). This data is not analysed in the present study.

Time 2: Self-disclosure and situational aspects of privacy

Participants completed a 10-item measure of behavioural self-disclosure. In this measure, participants respond to a sensitive item such as 'How many different sexual partners have you had?' using one of three options: they could submit the default option 'please choose'; disclose the information requested; or choose an 'I prefer not to say' option. A non-disclosure score was calculated by summing the number of items where an 'I prefer not to say' option was chosen. A further six items of a non-sensitive nature (e.g. season of birth) were included as filler items.

Following the disclosure measures, participants completed measures of trust and perceived privacy designed to elicit their perception of the survey situation. Both measures were answered using a five-point Likert scale (anchored at 'Strongly Disagree' and 'Strongly Agree'). The trust measure comprised eight items that incorporated the major dimensions of trust (Bhattacherjee, 2002; Jarvenpaa, Knoll & Leiner, 1998): Benevolence (e.g. 'The intentions of this survey are good'; 'The data I have provided will be kept secure and not exploited'); Competence (e.g. 'This survey's authors have the appropriate skills and competence to conduct online surveys'; 'This survey is professional'); Reliability (e.g. 'This survey's authors are a dependable research group'); Integrity ('I do not doubt the honesty of this survey or its authors'; 'The authors of the survey are trustworthy') and General trust (e.g.; 'I felt comfortable giving my personal information'). The reliability for this measure was.91. Four additional filler items related to the design of the survey (e.g. 'The design of the survey was clear') and motivation (e.g. 'I felt motivated to complete this survey').

The perceived privacy measure had two questions relating to anonymity ('I felt anonymous completing this survey') and confidentiality ('I am sure that my responses will remain confidential'), answered using the same scale. The reliability for this measure was.73.

Procedure

An invitation to complete the study was sent to panel members by e-mail. For Time 1, members were informed that the survey consisted of a series of questions about any privacy concerns they may have when they use the Internet, and their privacy related behavior. At Time 2, participants were told that the survey related to their 'Life experiences and season of birth', and that some of the topics covered in the survey may be sensitive, but that it was important for them to respond. The 'prefer not to say' option was outlined and they were told that the use of it would not imply any particular response.

At both time points, participants were informed that all information provided would remain confidential and that they could withdraw from the survey at any stage. For all items participants were prompted to use the full scale when responding and not only the labelled response options. Participant's responses were submitted at the end of each page of the survey.

The time 1 survey was left open for two weeks. Participants took, on average, 13 minutes to complete this part of the survey. Six weeks after data collection at time 1 was complete, an invitation to complete the time 2 survey was sent out to the same panel of participants. The delay between time 1 and time 2 was introduced to minimize the possible impact of the privacy measures on later disclosure behaviour. The time 2 survey was left open for two weeks. Participants took, on average, 12.3 minutes to complete it.

Results

To examine the nature of any relationship between situational and dispositional aspects of privacy on self-disclosure to the web-based survey, structural equation modelling (SEM) using the AMOS software program was completed. One advantage of SEM is that it allows for the comparison of entire models in terms of goodness of fit to the data (also called confirmatory SEM), rather than the testing of single pathways. Three possible models derived from the existing literature on privacy, trust and behaviour were tested. The first, proposed by Nickel and Schaumburg (2004), Sultan, Urban, Shankar & Bart (2002) and Malhotra *et al.* (2004) predicts that the impact of perceived privacy, privacy concerns and personality on behaviour is mediated by trust (see Figure 1, Model 1). The second model tested, based on the work of Metzger (2004), proposes that in addition to this mediation, a separate path exists between privacy concern, past behaviour and privacy-related behaviour (Figure 1, Model 3). The final model is based on the results our own preliminary work (Paine, Joinson, Buchanan & Reips, 2006) that suggested two independent pathways, with the situational path comprising perceived privacy mediated by trust, and the dispositional path comprising Internet privacy concern (see Figure 1, Model 3). In all cases, the measurement error (not shown in the models) was weighted at 1.

A comparison of the three models, using goodness of fit indices (GFI), is presented in Table 1. Multiple GFI are used (Hu & Bentler, 1999). Specifically, the Chi-squared value divided by the degrees of freedom (χ^2/DF), the comparative fit index (CFI) and the root mean square error of approximation (RMSEA) were used, alongside the variance explained, to evaluate the models. As a rule of thumb, an adequate model fit to the data would have a CFI of.95 or above, a RMSEA of below.05, and a χ^2/DF between 1 and 3.

Table 1: Goodness of Fit (GFI) indices, three models

	Fit indices				
Model	χ^2	df	χ^2/DF	CFI	RMSEA
Model 1 (Trust as mediator)	41.634	6	6.939	.932	.089
Model 2 (Trust as mediator, path through behaviour)	14.834	5	2.967	.982	.051
Model 3 (Separate pathways)	5.429	3	1.810	.995	.033

Using the multiple indices in Table 1, Model 3 represents the best fit to the data, and can be characterised as a good fit. This model also explained marginally more variance in the dependent variable (self-disclosure) than the other two models. This model was further refined using exploratory structural equation modelling, with the best fit presented in Figure 2.

Figure 1: Three potential models of the relationship between privacy, trust and selfdisclosure

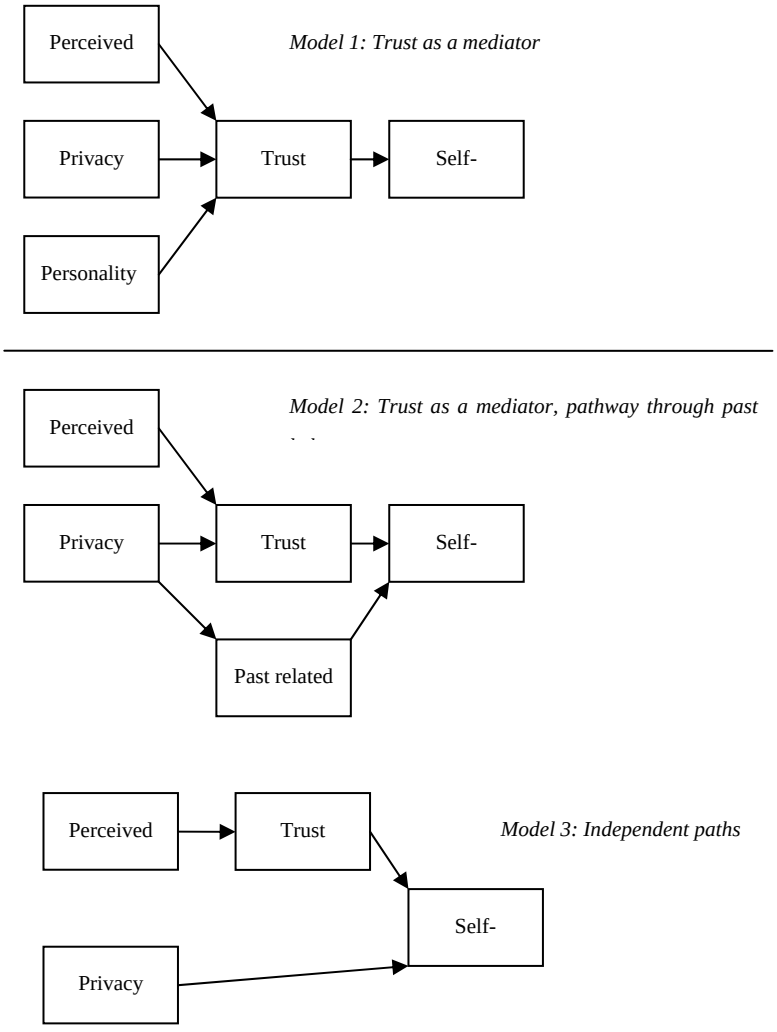
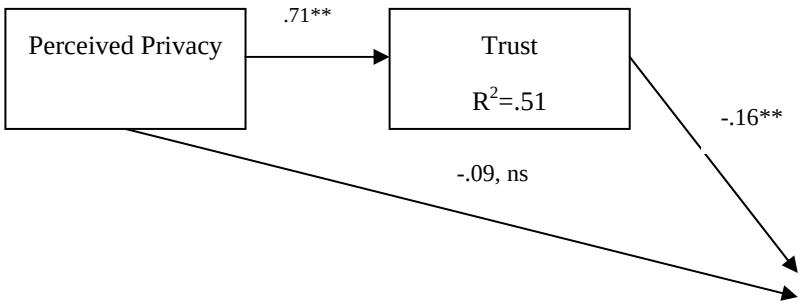
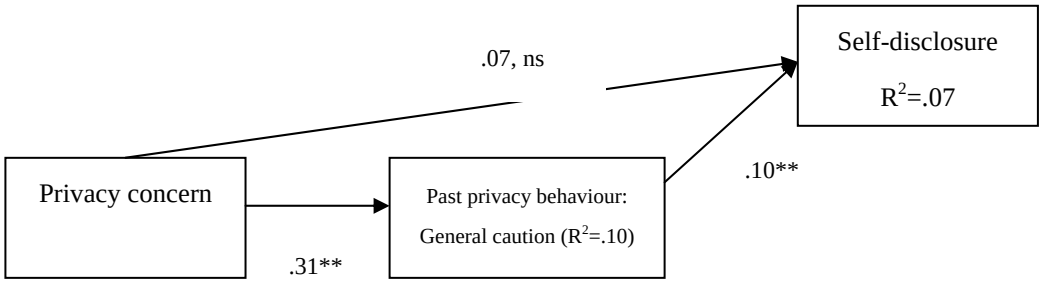


Figure 2: Best fit model, separate situational and dispositional pathways to predicting disclosure to a web-based survey





Note: * p<0.5, ** p<0.01, ***p<.001

Disc

People's specific privacy concerns predicted their willingness to disclose personal information to a web-based survey six weeks later. Two situational measures were also collected during the second part of the study; trust and perceived privacy. Both these measures also predicted people's willingness to disclose personal information to the web site. The structural equation model outlining separate pathways associated with situational interpretation and dispositional privacy preferences was the best fit to the data. The pattern of results suggests that, on a situational level, much of the effect of perceived privacy on behaviour can be explained by the impact of perceived privacy on trust, which then impacts on behaviour. The results also suggest that people's past behaviours are critically important in understanding the links between their privacy concerns and disclosure behaviour.

However, the evidence that the impact of perceived privacy on self-disclosure to web-based surveys is mediated by trust should not be unequivocally accepted. The self-report measures used to assess situational trust and perceived privacy may be unduly influenced in Study 1 by the act of disclosure that preceded the completion of the measures. Furthermore, the relationship between privacy and trust at a situational level may be an interaction (i.e. moderation) rather than mediation, something best tested using an experimental methodology (Baron and Kenny, 1986). Study 2 examines the relationship between situational privacy and trust in light of disclosure using an experimental design. Privacy and trust are experimentally manipulated via different web survey designs, and disclosure measured.

3. Study 2

Method

Participants

Participants were 181 Internet users recruited via advertisements on psychology and survey request web-sites. The majority (n=144, 80%) were female (missing data for 5 people). Almost three quarters (73.9%) were based in the United States, with the remaining from 16 other countries (the majority UK and Canada). The age range spread from under 16 (one person, removed from the analyses) to over 65 years, with the largest proportion aged 20-24 years (31.7 years).

Experimental manipulations

For the privacy manipulations, the first page of the web survey contained a either a strong or weak privacy policy developed using the guidelines identified by Culnan (1999) and previously used in the field (e.g. Metzger, 2004; Miyazaki & Krishnamurthy, 2002).

Specifically, the strong privacy policy included information on the type of information collected, that it would not be re-used or passed onto others, the security steps taken and provided full contact information for the researchers. The weak privacy condition did not include full disclosure of information collected and did not adequately protect information from re-use or security lapses. Pilot testing of the strong and weak privacy statement (n = 57) confirmed that the strong privacy policy was perceived as stronger at protecting privacy than the weak statement ($p<01$).

Trust was manipulated in a number of ways, based on the work of a number of researchers (e.g. Bhattacherjee, 2002, Fogg et al. 2001). In the high trust conditions, the survey was hosted in an educational domain (*open.ac.uk), while in the low trust condition it was hosted on a domain designed to reduce trust (www.surveylance.net). The high trust condition included an institutional logo, no spelling mistakes and no advertisements. The low trust condition incorporated advertisements for gambling and money transfer services (links deliberately broken) and spelling and coding mistakes. Otherwise, the text within the web-pages was identical. Pilot testing (n=20) confirmed that the trustworthy site was rated as significantly more trustworthy compared to the untrustworthy site ($p<.05$)

Self-disclosure

Disclosure was measured using the same technique outlined in Study 1. Participants completed four sensitive measures, each with an 'I prefer not to say' option. These items were, "How many serious relationships have you had since age 18?", "How many sexual partners have you had?", "Are you a religious person?", and "What is your annual income?". The disclosure measures were followed by a series of demographic questions (Age, Gender, Country) alongside a season of birth to maintain the face validity of the study.

Perceived trust and privacy

Perceived trust and privacy was measured using the same questions and response options as outlined in Study 1.

Procedure

A link to the study was placed on a series of psychological and survey related web sites (e.g. web experimental lab). The study topic was advertised as 'Life experiences and season of birth'. If participants clicked the link to the study, they were randomly allocated to one of the four conditions using Javascript. A 'no script' option directed them to a separate study. Only one participant was directed to this study using this link, suggesting that Javascript was not an impediment to completion.

The experimental manipulation was embedded in the front page introducing the study. To proceed, participants clicked on a consent button, and were then taken to a seriousness check – participants indicated on this page whether or not their answers should be included in the analyses. Following this, they then proceeded to the disclosure items (arranged on a single page).

Results

Given the limited number of self-disclosure items (four) in the present study, participant's responses were dichotomised into those disclosing to all questions (76.1%) and those non-disclosing to at least one question (23.9%). The proportion of non-disclosers and disclosers in each condition is shown in Table 2.

Table 2: Percentage of full disclosure by condition

		Privacy	
		High	Low
Trust	High	78.3%	82.1%
	Low	85.1%	60.4%

A Chi-square test of association identified a significant association between condition and disclosure, specifically related to the combination of low privacy and low trust (χ^2 (1, 95) = 7.28, p <.05 privacy in low trust, p =.19, *ns* privacy in high trust. The pattern of results suggests that the impact of privacy on self-disclosure to a web-based survey is moderated by trust.

Discussion

The results of the present study demonstrate a strong moderator relationship between privacy and trust on self-disclosure to a web-based survey. Self-disclosure was only substantially reduced when a weak privacy policy was combined with cues designed to reduce trust. In the conditions that combined high trust with low privacy, or low trust with high privacy, there was no evidence that self-disclosure was reduced. The results of Study 2 suggest that the relationship between privacy and trust may be significantly more nuanced than one of simple mediation found in Study 1. Specifically, the results suggest that the impact of privacy on self-disclosure to a web-based survey is moderated by trust, but that this moderation is not linear. The results also suggest that to fully understand people's reactions to potential privacy threats posed by web-based survey questions, it is imperative to also measure their trust in the survey organization or sponsor.

General discussion

The present studies are, to our knowledge, the first to include both situational and dispositional aspects of privacy and trust in the study of online disclosure to web-based surveys, both experimentally and survey-based. Importantly, in Study 1 we also separated the measures by six weeks, reducing the likelihood of any priming effect between the privacy measures and privacy related behaviour, and measured actual behaviour rather than reported actions or intentions.

The results of the two studies present strong evidence that privacy – both dispositional concerns and as designed into the specific survey – influences people's willingness to disclose personal information to a web-based survey. Second, the structural equation modelling in Study 1 suggests unique, independent effects of both dispositional and situational privacy processes that may have important implications for understanding the apparent disjuncture between people's reported privacy concerns and their actual behaviour. If there are no substantial links between people's privacy concerns in general and their interpretation of the situation, then it would be expected that any link between general privacy concerns and people's responses to sensitive items in a web-based survey would be weak or non-existent. Furthermore, in Study 1 the impact of perceived privacy on self-disclosure was mediated by trust.

The results of Study 2 show that trust acts to moderate the impact of reduced privacy on self-disclosure to a web-based survey. The relationship between privacy and trust found in Study 2 goes a long way towards explaining why people may be willing to forgo privacy concerns when faced with a trusted requestor, and why privacy is important when faced with a request from an organization one does not trust. The implications for survey organisations are critical – while much of the time personal or sensitive information may be requested by a survey, in the presence of high trust, this should not pose a problem for item non-response. However, in the absence of trust, we would argue that the same request is considerably more likely to be ignored.

The research literature on trust suggests that survey organisations may be able to boost trust in a number of ways. First, reputation is important in establishing trust – so survey organizations should seek to highlight their reputation not only to potential clients, but also to potential respondents. Trust and reputation can also be encouraged by including references to a 'real world' presence (e.g. through photographs of buildings, geographically located telephone numbers, full contact details). Other mechanisms for building trust in online surveying would be through demonstrations of competence – for instance, in the recruitment of respondents, management of panel membership, distribution of points or prizes and actual design and usability of the surveys. In Study 2, one of the key triggers towards lack of trust was the inclusion of adverts, which presumably led respondents to doubt the professionalism and benevolent intentions of the fake survey organization. For survey organisations, we would suggest that steps to protect respondent integrity and privacy would also lead to increases in trust.

The results of the present paper show that survey organizations ignore issues of privacy and trust at their peril. While the importance of respondent privacy in non-response (both item and unit non-response) is relatively well recognized, the potential interactions between privacy and trust in response behaviours identified in the present research highlight the importance of not only protecting respondent privacy, but also of engendering trust when requesting potentially sensitive personal information.

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