ABSTRACT

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The comparison of traditional and computer-based survey formats has received considerable attention in past research, along with questions about the effects of anonymity on the candor of survey respondents. As computerized survey methodologies have evolved, the Internet has presented researchers with an alternative to paper-and-pencil survey administration, although it may also pose problems of sampling (i.e., ensuring that respondents are from the target population). Access controls have been suggested as a way to deal with sampling problems, though the impact of access controls on respondents has not been fully investigated. While many survey sponsors make assurances to respondents as to the anonymity afforded to them, some have argued that access controls may undermine these assurances. In this study, the construct of anonymity perceptions are defined and subsequently examined in several survey contexts that vary in terms of survey modality (i.e., paper versus Web) as well as the style of access control implemented. Respondents (N = 322) were asked to complete an instructor evaluation and university climate survey. Respondents were randomly assigned to one of four survey conditions: Paper-and-pencil, Web-based with no access controls, Web-based with group access controls, and Web-based with individual access controls. This study did not find significant differences between survey conditions for perceptions of anonymity or impression management. In addition, perceptions of anonymity were not found to be significantly related to response distortion, contrary to research hypotheses based on previous empirical and theoretical research. The implications for examining anonymity as a subjective, rather than objective, factor in future survey research are discussed.
Effects of Survey Modality and Access Controls on Perceived Anonymity and Socially Desirable Responding

by
Thomas James Whelan

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APPROVED BY:

Lori Foster Thompson
Committee Chair

Adam W. Meade

Mark A. Wilson
BIOGRAPHY

Thomas James Whelan was born on January 23, 1980 in Hingham, MA. He lived with his family in Hingham until moving to Dunedin, FL in 1985. Thomas graduated from Dunedin High School in Dunedin, FL in 1998 and began undergraduate studies at the University of South Florida in the fall of that year. He graduated in 2002 with a Bachelor of Art degree in Psychology.

In the fall of 2005, Thomas began graduate study at North Carolina State University in the Industrial and Organizational Psychology Doctoral program. His research interests include electronic performance monitoring, organizational behavior in computer-mediated work environments, the use of intelligent/embodied agents in the workplace, applications of Monte Carlo data simulation techniques, the impact of technology on work motivation, and perceptions of anonymity in Web-based surveys.
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Introduction

Organizational surveys are an important mechanism for data-driven decision making in the workplace. For many organizational antecedents and outcomes of interest, surveys are used to gather employee opinions when it is either difficult or impossible to measure variables in an objective manner. For example, surveys can be used to assess turnover intentions (Price & Mueller, 1986), job satisfaction (Stanton et al., 2002), and organizational commitment (Mowday, Steers, & Porter, 1979). Surveys enable organizations to obtain extensive data about their employees while ensuring that a uniform questionnaire is being distributed to allow for later comparison and analysis between individuals and across groups or samples.

Questionnaires have traditionally been administered in a paper-and-pencil format, though the practice of survey administration has been evolving since the introduction of computerized surveys. Many advantages of utilizing a computer to conduct a survey, such as easier scoring and cost-effective distribution, have led organizations to adopt computer-administered survey methodologies (Birnbaum, 2004; Feigelson & Dwight, 2000; Lenert & Skoczen, 2002; Stanton, 1998). In addition, computer-administered surveys can eliminate errors in coding and scoring, can allow administrators to record the number of times a respondent changed his or her answer to an item, can indicate whether or not a respondent answered questions out of presentation order, and can also provide quicker feedback to the respondent (Fox & Schwartz, 2002). As such, researchers have continued to consider the implications of using the computer as a survey medium to determine where and how it differs from traditional survey methods in both its advantages and its shortcomings.
Deficits in the quality of data collected via computer-based questionnaires, compared to paper questionnaires, could impact the usefulness of such data for purposes of selection, assessment, and organizational development (Chapman & Webster, 2003; McManus & Ferguson, 2003). Accordingly, it is important to identify the mechanisms through which a survey medium may affect measurement outcomes. A long-standing sentiment concerning anonymity and surveys is that the practice of identifying respondents in any way may yield invalid data, as individuals will be less candid if they know their name can be tied to their responses (e.g., Corey, 1937). The candor with which respondents answer items is vital if the results of the survey are to be useful, particularly when the survey content contains any sensitive or potentially embarrassing questions (Feigelson & Dwight, 2000). Organizational members are often promised anonymity and impunity from managerial retaliation for revealing sensitive information in order to encourage honest responses. However, anonymity assurances can only have the desired effect on truthfulness if respondents believe the assurances are true. If respondents have reason to believe that their anonymity either is or could be compromised, they might distort their responses to appear more socially desirable (Richman, Kiesler, Weisband, & Drasgow, 1999). Additionally, respondents who do not believe anonymity assurances may be reluctant to answer sensitive items or fail to complete the survey, since taking a survey is usually a voluntary behavior (Rogelberg, Spitzmüeller, Little, & Reeve, 2006; Thompson & Surface, 2007). In this sense, the method of collecting survey data may have less of an impact on an individual’s honesty than the context under which that individual responds to the survey (Hinrichs & Gatewood, 1967).
A relatively unexplored topic in survey research concerns the subjective perceptions of anonymity afforded to a respondent by a given survey. An empirical inquiry into the notion of perceived anonymity may inform researchers of the need to account for variance in how individual respondents feel about anonymity assurances. The purpose of this study is to examine whether advances in survey delivery technology influence respondents’ perceptions of anonymity, as well as their impression management tendencies, when completing an opinion survey.

*The Shift toward Electronic Administration Modalities*

Given the aforementioned advantages of computerized surveys over paper-and-pencil questionnaires, many researchers have attempted to investigate precisely where and how one modality may be superior to the other. For example, there are well documented differences in response rates. With computer administered surveys, particularly in a Web-based format, past research suggests that response rates have a tendency to be poorer than for paper-and-pencil surveys (Bosnjak & Tuten, 2003; Crawford, Couper, & Lamias, 2001; Cronk & West, 2002; Kaplowitz, Hadlock, & Levine, 2004). However, scores and covariance across both survey formats have been found not to differ significantly (Cronk & West, 2002; McCabe, 2004; Stanton, 1998).

A distinction should be made, however, in discussing what past research has defined as a “computerized” survey when discussing differences between modalities. In much of the research from the 1980’s and early- to mid-1990’s, computer-administered equivalents of traditional instruments and surveys were simply administered via computer, and were seldom more than a version of the paper survey transposed onto a computer monitor. The majority of
very early computer-administered instruments and surveys were different from their paper-and-pencil counterparts in terms of the restrictions on how respondents could move through items, since questions were often presented one at a time in computerized surveys, lacking the option for a respondent to “back track” and change previous responses (King & Miles, 1995). However, as computer technology improved and the use of computerized surveys became more frequent, research began to show that they can be essentially equal to, if not better than, traditional surveys in terms of the variety of ways respondents can move through and complete a given survey (King & Miles, 1995; Mead & Drasgow, 1993).

Computer-administered surveys are now predominantly Web-based in modern organizational applications, since the Internet permits organizations to distribute surveys with ease and uniformity to their employees (Barak & English, 2002; Stanton, 1998). The technological complexity of the Internet and the versatility of hypertext markup language means that the modern survey can potentially be much more sophisticated and interactive than its paper-and-pencil equivalent. For example, Web-based surveys can use a variety of tools to present Likert-style scales, such as radio buttons and graphic sliders, with basically equivalent results between response presentation types in terms of score variance and score reliability (Cook, Heath, Thompson, & Thompson, 2001), though factors such as longer response times and the lack of visibility of all response options can contribute to error (Couper, Tourangeau, Conrad, & Crawford, 2004; Healey, 2007).

There may be differences, however, between a computer-based and a Web-based survey. Delivering a survey on a computer carries advantages and disadvantages, as already mentioned, but moving a survey to a Web-based delivery may have qualitatively different
implications that have not been considered. The fact that a survey is Web-based can imply an inherently social aspect to its use which may be absent in a simple computerized survey (Joinson, 1998). Since a Web-based questionnaire is typically hosted on a remote server, and no special software may be needed on the respondent’s computer, the necessary communication with a server could make this social aspect more salient to some respondents (i.e., because their responses are being collected somewhere else besides their own computer). While some researchers have argued that computers are patently nonsocial (i.e., Martin & Nagao, 1989), there is evidence that individuals will apply social rules and norms to computers and interact with them as if they were another person (Nass & Moon, 2000; Reeves & Nass, 1996). The use of the Internet as a research platform may be exacerbating the social attributions made toward computers.

Although there may be differences between computer-administered and Web-based surveys, many of the assumptions about Web-based surveys are drawn from research studying computer-based surveys. As noted by Barak and English (2002), there are not a large number of published empirical studies that compare Web-based surveys to paper-and-pencil surveys. This could be due in part to the fact that the Internet has not attracted much research attention as a survey modality, or that researchers have generalized results about computer-based surveys to Web-based surveys without investigation (Barak & English, 2002). Further, O’Neil and Penrod (2001) stated that few researchers “have looked at whether methodological variables associated with Web-based research affect the quality of the data collected” (p. 226). Therefore, a survey in an Internet context may breed a unique
host of concerns for respondents that have not previously been identified or investigated by research.

*Privacy on the Internet*

Privacy on the Internet seems to be a growing area of popular apprehension (Buchanan, Paine, Joinson, & Reips, 2007; Joinson & Paine, 2007; Karat, Karat, & Brodie, 2005; Kizza, 2003; Lane, 2003; Malhotra, Kim, & Agarwal, 2004; O’Neil, 2001; Turow & Hennessy, 2007). As Buchanan et al. (2007) noted, “information about us is accessed, stored, manipulated, data mined, shared, bought and sold, analyzed, and potentially lost, stolen, or misused by countless government, corporate, public and private agencies, often without our knowledge or consent” (p. 157). This could have implications for Web-based survey practices, as research by Huang and Liaw (2005) has shown that attitudes toward the Internet influenced respondents’ choices to use Web-based surveys. Indeed, the question of how privacy plays a role in respondent reactions to Web-based surveys has received considerable attention by researchers (e.g., Paine, Reips, Stieger, Joinson, & Buchanan, 2007; Sills & Song, 2002; Simsek & Veiga, 2001). However, respondents’ privacy concerns about the Internet may or may not be grounded in reality. Most people do not have accurate knowledge of privacy technology and the vulnerabilities of the computer systems hosting the surveys; at the same time, they may have erroneous beliefs about what are and are not safe practices (Graeff & Harmon, 2002; Jensen, Potts, & Jensen, 2005).

While people may not understand the objective provisions protecting the integrity of their responses, they could still harbor low perceptions of the anonymity afforded by a survey or have suspicions regarding the computer upon which a survey is presented. That is, there
appears to be a public awareness that Internet usage poses privacy threats even though many computer users lack the knowledge needed to fully comprehend survey privacy and sufficiently protect their own personal computers (Lane, 2003). This suspicion may be justified, as organizational practices that can potentially invade privacy are becoming commonplace, and the consequences of employee use or misuse of computers are becoming increasingly stringent (Lane, 2003). According to a survey conducted by the American Management Association (2005), 76% of organizations track online activity, and 36% record computer activity such as keystrokes. When coupled with the fact that 26% of organizations have fired an employee for Internet misuse, organizational monitoring practices can present serious implications for the employees who use the Internet at work. From the burgeoning awareness of privacy issues, in addition to the concurrent rise in the use of workplace monitoring, the actual objective anonymity a survey affords may in fact have little influence on a respondent. Instead, subjective individual perceptions of anonymity, in spite of assurances of objective anonymity, may have a significant impact on how people answer a Web-based survey. In short, when people know (or merely suspect) their online work activities are being monitored, they may have difficulty trusting that their responses to a Web-based survey are anonymous.

Defining Perceived Anonymity

Anonymity has not received much attention in the extant literature as an outcome that may vary between individuals, even though the influence of anonymity has been examined repeatedly in research concerning privacy and survey methods (e.g., Ash & Abramson, 1952; Klein, Maher, & Dunnington, 1967; Olson, 1936; Rosen, 1960). Anonymity can be broadly
defined as not being personally identified in public (Kizza, 2003). The concept of anonymity is relevant to both larger social contexts, such as crowds, and smaller contexts, such as computer-mediated communication between two people (Christopherson, 2007). Surveys that seek to encourage candor often make assurances of anonymity to respondents and may refrain from asking people to provide personally identifiable information, such that survey sponsors would be prevented from connecting an individual to his or her responses. However, many researchers have advocated using deceptive methods of identifying individual surveys while leading respondents to believe that they are anonymous (e.g., Dickson, Casey, Wyckoff, & Wynd, 1977; Manniche & Hayes, 1957). For most researchers, whether or not survey respondents are anonymous is often a relatively straightforward issue of methodological design.

In the computer science literature, Pfitzmann and Hansen (2006) defined anonymity as “the state of being not identifiable within a set of subjects, the anonymity set” (p. 6). Further, they defined the anonymity set as “the set of all possible subjects… who might cause an action” (Pfitzmann & Hansen, 2006, p. 6). The notion of an anonymity set is a commonly used metric in computer science research (Díaz, 2005; Serjantov & Danezis, 2003). In this conception, anonymity is reliant upon the number of subjects who may also be engaging in the same task (e.g., a survey) as an individual, such that the individual is part of a larger group. As shown by Díaz (2005), the probability of any one individual in a group being tied to a specific piece of identifiable information is vital to the objective anonymity of a computer system; the smaller the probability, the greater the anonymity of any one individual in the anonymity set. Consistent with this definition, anonymity in the context of a
questionnaire can be conceptualized as “the degree to which the identity of a message source is unknown and unspecified; thus, the less knowledge one has about the source and the harder it is to specify who the source is among possible options, the more anonymity exists” (Scott, 2005, p. 243).

The prior conceptualization of anonymity specifically attends to the objective anonymity afforded by a computer system in which data are transmitted or stored—it does not address the subjective experience of an individual user who is part of an anonymity set. Clearly, there is a need to understand what may influence subjective perceptions of anonymity for a particular survey respondent. The idea of the individual as part of a larger anonymity set can serve to illuminate how perception formation may occur. In all likelihood, there are differences in how respondents interpret information about the size of the anonymity set to which they perceive they belong. For example, survey recipients may be differentially sensitive to the notion that Web-based surveys can transmit a “digital footprint” indicating data such as the survey response time, date, or even the IP address of the computer on which the survey was completed. If a survey respondent believes his or her “digital footprint” is tied to a Web-based survey, this perception may functionally reduce the perceived anonymity set to the single survey respondent. This may effectively afford the survey no perceived anonymity for the individual, whether or not a “digital footprint” is truly being made.

Investigations of survey privacy in psychological research have often ignored subjective perceptions of anonymity, instead examining the differences between objectively defined anonymous (or non-identified) respondents and identified respondents (e.g., Booth-
Researchers have studied the differences in the data quality generated by anonymous and identified respondents not only for variables relevant to organizations, but also for sensitive survey topics such as self-reports of drug use (Bjarnason & Adalbarnardottir, 2000; O’Malley, Johnston, Bachman, & Schulenberg, 2000), erotophilia (Durant, Carey, & Schroeder, 2002), and sexual abuse as a child (Olson, Stander, & Merrill, 2004). The difference between anonymous and identified survey conditions in recent research has frequently been operationalized as a request for personally-identifiable information (PII) or by the lack of this request, yielding a division between survey formats based solely on whether PII (e.g., name, social security number, etc.) was present or absent (Booth-Kewley et al., 1992; Lautenschlager & Flaherty, 1990; Moore & Ames, 2003).

However, some research findings have implied that the difference between anonymous and identified conditions may be more subtle and possess a subjective component. Based on their research, Fox and Schwartz (2002) concluded that assignment to anonymous versus identified survey conditions did not show a significant difference on outcomes of impression management (i.e., intentional distortion of responses). They found that some respondents tended to rate high on measures of impression management despite assurances of anonymity, and suggested that this result could have been due to respondents’ disbelief that their responses to the survey were truly anonymous. Fox and Schwartz (2002) did not measure perceived anonymity but rather assumed respondents held certain perceptions based on random assignment to experimental conditions where anonymity was or
was not conveyed to participants. If anonymity was a measurable perception and not merely an experimental condition or objective category, then ratings of perceived anonymity may account for significant variance in an outcome such as impression management.

Some researchers have attempted to distinguish between varying degrees of identifiability. For instance, a study by Hartnett and Seligsohn (1967) examined the effects of requiring (or not requiring) 328 undergraduate students to put their name and student number on survey materials. In their first condition, they instructed respondents not to put their name on any of the materials; in the second condition, they instructed respondents to put their name only on their questionnaire and not on their answer sheet; in the third condition, respondents were asked to put their name on the questionnaire and answer sheet, with an assurance that they would not be identified with their responses; in the fourth and final condition, respondents were asked to put their name on the questionnaire and answer sheet, with no assurance that they would not be identified with their responses. The results of analyses to determine whether or not respondents were more likely to answer personal questions based on their assignment to these conditions were ultimately inconclusive. Hartnett and Seligsohn (1967) concluded that the impact of anonymity on responses was a complicated factor to understand, and suggested that researchers not rely on experimental conditions as a means of making inferences about how candid, and therefore how uninhibited, respondents may be when completing a survey.

As such, examining the effect of objective manipulations of anonymity on outcome variables does not take into account respondents’ perceptions of the likelihood that they will be identified, and arguably may not be sufficient to draw conclusions about anonymity in
surveys as it affects response behavior. Even though a respondent may receive several assurances of the anonymity of a survey, as he or she would for the purposes of research, a respondent may be influenced by the presence of social cues in the surrounding environment, such as the perceived verifiability of his or her responses to survey items (Rosenfeld et al., 1996). Further, there may not be homogeneity across different research studies with respect to the nature of assurances made to respondents in informed consent procedures (e.g., Sobal, 1984), so the effect of anonymity assurances on respondent perceptions may not be the same every time an individual agrees to complete a survey instrument.

Indeed, in several studies that have examined anonymous and identified respondents with inconclusive findings, authors have included caveats pertaining to contextual factors that may have affected respondents’ perceptions that a survey was actually anonymous, thereby undermining the effectiveness of any anonymity assurances made on the part of the experimenters. For instance, Fox and Schwartz (2002) stated that because they used a military sample, respondents may not have believed the survey was strictly for research purposes, and the assurance of anonymity may not have been taken in earnest. Holden, Magruder, Stein, Sitarenios, and Sheldon (1999) cited the differences in temporal circumstances under which their survey was taken which may have adversely affected how respondents interpreted the intentions of the survey sponsors. In summary, inconsistent results regarding the effects of anonymity assurances may be due to the fact that anonymous and identified conditions can blur when respondents do not believe anonymity assurances. Results such as these highlight the need to examine anonymity as a subjective perception.
It should be noted that the importance of subjective anonymity has not been entirely ignored in empirical research. Recently, Whelan (2007) showed that there were differences in ratings on a single item pertaining to survey-specific anonymity perceptions across anonymous and identified survey conditions in the absence of significant differences on a behavioral inventory measure. However, simply attempting to capture perceptions of anonymity with a single-item measure or manipulation check may not be sufficient to make any meaningful inferences as to how an individual feels about the integrity of his or her information (Haans, Kaiser, & de Kort, 2007). A study of response behavior by Rogelberg et al. (2006) contained a two-item measure of survey-specific anonymity perceptions. The items asked respondents to indicate how much they agreed or disagreed with statements pertaining to the security of the general process of Web-based surveys and the privacy afforded by the university server on which the survey was hosted. Rogelberg et al. (2006) found evidence that anonymity perceptions influenced response intentions to an organizational survey, and called for further utilization of perceived anonymity by researchers.

The present study focuses on subjective anonymity with the intention of distinguishing between literal anonymity and the experience of the respondent, which may be an important distinction for researchers and practitioners to consider when using surveys to collect data from organizational samples (Dunnette & Heneman, 1956). Holden et al. (1999), Joinson (1999), Richman et al. (1999), Rogelberg et al. (2006), and Thompson and Surface (2007) have posed challenges for future research to attempt to clearly operationalize the construct of anonymity and link subjective anonymity to contextual attributes of the survey, which the current study aims to achieve. The accomplishment of such an objective requires a
clear definition of perceived anonymity. Drawing from the literature in computer science and psychology, the present study defines perceived anonymity as consisting of three facets: (a) the perception of the relative nonidentifiability of a respondent, (b) how immersed a respondent feels in some arbitrary set of survey respondents, and (c) how likely it is that a respondent feels his or her personal information can be traced back to that individual for identification.

*Influence of Survey Modality and Access Controls on Perceived Anonymity*

Survey privacy has been identified by several researchers as a notable concern when utilizing different survey methodologies (Milne, Rohm, & Bahl, 2004; O’Neil, 2001; Thompson et al., 2003). Cho and LaRose (1999) stated that “privacy is a more sensitive issue for Internet surveys than for conventional survey media” (p. 428). Furthermore, it is possible for an individual’s identity to be detected even without asking for PII, and some survey respondents may be aware that this threat exists. For instance, Malin and Sweeney (2004) showed that the use of encrypted data does not necessarily ensure anonymity, due to the data trails left by computer activity. If the purpose of survey anonymity is to allow an individual to respond to items without having his or her identity tied to the responses, the “digital footprint” left by computer activity may render complete anonymity difficult or impossible to achieve when Web-based surveys are used.

Despite potential anonymity concerns, Web-based surveys have been touted as offering a number of advantages, though often at the price of latent sampling problems more likely to occur with the Internet, such as the possibility of an uncontrolled respondent pool (Stanton, 1998; Thompson et al., 2003). Access control mechanisms can be used to curb
these sampling problems by functioning as a measure to prevent unsolicited respondents from accessing a survey (NCSC, 1988). Access control is typically achieved through the use of some type of password or access key (i.e., a personal identification number, or PIN) that enables a respondent to access and complete a Web-based survey. Access controls can be assigned to either individuals or groups. For example, an individual access control would be implemented when each respondent to a survey must input a PIN to be able to complete the survey, and each PIN is unique to the individual. Individual access controls are often used when authentication, or verification of an individual respondent’s identity, is important to the researcher for purposes of filtering data after they have been collected (Stanton & Rogelberg, 2001). Alternatively, a group access control would be implemented when multiple people are given the same PIN, which ensures that only individuals in that group can access the survey, although the PIN is not unique to any single individual. Group access controls are sometimes used in order to allow individuals in a population of interest to complete a survey while preventing others who are not part of the target population from completing the survey, especially in situations where the authentication of individual respondents is not important to the survey sponsor. If a researcher chooses to forgo the use of access controls, there may not be another suitable method to reliably restrict who responds to a survey (Stanton, 1998). However, the unintended consequences when using a PIN as an access control to a survey have not been extensively researched.

There are several potential systemic problems that could result from the use of access controls. For example, if an employee had an inconsistent connection to the Internet, an access control might not allow the individual to log on to a survey for a second time to finish
his or her survey if there was a connection problem. Also, employees who either travel frequently or work from home might not have access to the type of computer that would allow them to complete a survey if the access control is inflexible in its implementation (for instance, being restricted to an organization’s intranet), or if it is browser specific (Thompson et al., 2003). In contrast, the absence of an access control may lead to situations in which a respondent submits his or her survey answers several times, which could be problematic for subsequent data analysis (Roztocki & Lahri, 2003; Stanton & Rogelberg, 2001).

Restricting who can and cannot access a survey has obvious appeal for controlling sampling, and it may impact respondent drop out and responses to sensitive survey items (Crawford, Cooper, & Lamias, 2001; Heervegh & Loosveldt, 2002). Similarly, Dillman (2000) advocates the use of a PIN to control not only the sampling of survey respondents but sampling error as well. However, the use of access controls may have considerable potential to raise respondents’ suspicions about anonymity (Stanton, 1998). If respondents are wary of the privacy afforded by the survey, the use of access controls could lead to a “big brother syndrome” as discussed by Rosenfeld et al. (1996), such that participants may answer sensitive questions, but they will distort their responses in reaction to a perceived “other” (Stanton & Rogelberg, 2001). Stanton (1998) noted that although “anonymous responding is preferable for maximizing respondent candor… people’s beliefs about anonymity on the WWW with or without access control are presently unknown” (p. 724).

In this study, it is expected that survey characteristics such as modality and access controls will subsequently affect how individual respondents view the anonymity afforded by the survey. It is expected that the survey medium and the use of access controls will alter
respondents’ perceptions of their anonymity set, thereby influencing perceived anonymity. On average, paper-and-pencil respondents\textsuperscript{1} should experience greater perceived anonymity than those completing Web-based surveys without access controls because some members of the latter group are likely to assume that “digital footprints” reduce the size of their anonymity sets. By making the possibility of a “digital footprint” increasingly salient, the implementation of access controls is expected to further reduce survey respondents’ perceived anonymity sets. Web-based respondents assigned a group access control should perceive less anonymity than those completing Web-based surveys without access controls. Those assigned individual access controls should perceive even less anonymity than their group access counterparts as the perceived anonymity set shrinks from the group to the individual.

Hypothesis 1: Survey modality will affect anonymity perceptions such that perceived anonymity will be greatest for paper surveys, followed by Web-based surveys without access controls, Web-based surveys with group access controls, and Web-based surveys with individual access controls respectively.

Relationship between Perceived Anonymity and Impression Management

Organizations, practitioners, and researchers should be concerned about the conditions in which individuals complete surveys, and the influence that the social environment can have on respondent candor. A survey context that promotes perceptions of anonymity can disinhibit respondents, thereby freeing them from any risks they may perceive as associated with being identified. Anonymity does not have to produce antisocial behavior, as is the focus of much deindividuation research, but can liberate people’s behavior whether
it is prosocial or antisocial in nature (Gergen, Gergen, & Barton, 1973). Ultimately, this liberated behavior is optimal for collecting undistorted data via survey practices.

To understand the relationship between perceived anonymity and candor, the term evaluation apprehension should be considered. Evaluation apprehension was originally defined by Rosenberg (1965) as “an active, anxiety-toned concern that [the subject] win a positive evaluation from the experimenter, or at least that [the subject] provide no grounds for a negative one” (p. 29). The presumed relationship between anonymity and evaluation apprehension is illustrated in the design of a study by Thomas et al. (1979), which operationalized high evaluation apprehension as a survey condition in which respondents were identified, and low evaluation apprehension as a survey condition in which respondents were anonymous. Thus, an important determinant of evaluation apprehension may be perceived anonymity; as an individual feels more anonymous, he or she will have less concern for social evaluation (Zimbardo, 1969).

The notion of evaluation apprehension as an individual’s anticipation of negative outcomes explains how a survey respondent’s candor could be affected by anonymity threats. When survey recipients perceive the anonymity of their responses to be low, they may be more concerned with the potential consequences of truthfulness, leading to socially desirable response distortion and impression management. Socially desirable responding can be defined as “the tendency to give answers that make the respondent look good” (Paulhus, 1991, p. 17). Impression management is a specific case of socially desirable responding in which respondents intentionally and knowingly distort their answers to present a positive social image to others (Paulhus, 1991).
Unfortunately, impression management is present, to some degree, in almost all surveys (Nancarrow, Brace, & Wright, 2001). To this end, impression management has been measured in many studies that consider survey anonymity (e.g., Booth-Kewley et al., 1992; Joinson, 1999; King & Miles, 1995; Lautenschlager & Flaherty, 1990; Rosenfeld et al., 1996). A meta-analysis by Richman et al. (1999) demonstrated that even though stated assurances of anonymity did not significantly alter survey responses, surveys administered in the presence of others yielded more socially desirable response distortion than those administered alone. Lindeman and Verkasalo (1995) found that the social context of the respondent exerts significant influence over impression management scores, such that impression management increases as the environment becomes less private. Additionally, Thomas et al. (1979) concluded that ratings of social desirability can be influenced by the testing situation, insofar as whether a respondent could or could not be successfully identified. Therefore, perceptions of anonymity may be instrumental to outcomes of impression management. Despite the potential importance of perceived anonymity, however, impression management in computer surveys may not be a simple function of the presence or absence of requests for personally identifiable information. An obstacle when elucidating the differences between anonymous and identified survey conditions as they have been studied in the past is that researchers have not found consistent results in regard to how these conditions affect response distortion.

Paulhus (1991) stated that conditions of anonymity should reduce outcomes of response distortion, a notion that has been echoed by Holden (1994), and Feigelson and Dwight (2000). Several research studies support this view (e.g., Booth-Kewley et al., 1992;
Joinson, 1999; Lautenschlager & Flaherty, 1990; Rosenfeld et al., 1996). In a meta-analysis that considered impression management and computer-administered questionnaires, Richman et al. (1999) concluded that when anonymous surveys were used, and when “back-tracking” was allowed in the survey administration, impression management was not as prevalent as when identified surveys that disallowed back-tracking were used. However, other studies have found no difference between anonymous and identified conditions (e.g., Britton, Richardson, Smith, & Hamilton, 1983; Holden et al., 1999; Moore & Ames, 2003). For example, Fox and Schwartz (2002) examined 200 men seeking admission to a military course who were divided randomly into anonymous or identified conditions. Participants responded to a questionnaire that included scales of self-concept, perceived control, anxiety, and social desirability. Results revealed no difference between anonymous and identified survey conditions for the outcome of response distortion. That is, there was no main effect for the anonymity manipulation. Other researchers (e.g., Holden et al., 1999) have yielded similar results to Fox and Schwartz’s (2002) findings, with various explanations as to why a difference between anonymous and identified conditions was not found.

Considering the inconsistent results of the above studies, it may be informative to revisit the distinction between objectively manipulated versus subjectively perceived anonymity. Past studies have objectively manipulated anonymity via survey items asking for PII or other identifying information. However, the practice of excluding survey items asking for PII such as a respondent’s name may not ensure high levels of perceived anonymity. Individual differences in perceptions of anonymity within the conditions examined in past research could help account for the failure to consistently uncover significant response
distortion differences between groups assigned to surveys which do or do not require PII.

Recall that it is the perception of anonymity that should theoretically influence socially desirable response distortion due to its effects on evaluation apprehension. If survey respondents perceive their anonymity to be high, and they perceive themselves as part of a larger anonymity set, they should feel less inhibited based on this perceived group size (Postmes & Spears, 1998), and therefore engage in less response distortion. If evaluation apprehension is triggered by perceptions of a small anonymity set and low perceived anonymity, respondents may engage in more response distortion. Thus, requests for PII will only systematically influence impression management when they affect respondents’ anonymity perceptions.

In summary, inconsistent results of research examining the link between anonymity and impression management may be clarified by moving beyond objective manipulations of identifiability and instead examining whether subjective perceptions of anonymity predict impression management. The present study addresses this research need. Impression management is expected to be influenced by the respondents’ perception of survey anonymity, such that when perceived anonymity is low, impression management ratings are higher, and vice versa. Even if a respondent’s perceived identifiability is illusory, it should be the perception of identifiability that influences response distortion.

Hypothesis 2: Perceived anonymity will predict response distortion such that perceived anonymity will be negatively related to impression management tendencies.
Individual Differences in the Influence of Perceived Anonymity Threats on Impression Management

It is possible that the relationship between perceived anonymity and socially desirable responding varies somewhat across individuals. That is, all survey respondents might not react to low perceptions of anonymity in the same way. Public self-consciousness, or concern with how the self is perceived by others (Scandell, 1998), may exacerbate the effects of low perceptions of survey anonymity on socially desirable responding. Self-consciousness can be considered a disposition, reflecting a tendency for thinking about “self-aspects that are matters of public display, [and] qualities of the self from which impressions are formed in other people’s eyes—for example, one’s overt behavior, mannerisms, stylistic quirks, and expressive qualities” (Scheier & Carver, 1985, p. 687).

Fenigstein, Scheier, and Buss (1975) stated that self-consciousness as a disposition can be considered a moderating variable between self-reports and behavior—in this study the parallels could be perceived anonymity and impression management, insofar as impression management can be considered a behavioral phenomenon. Public self-consciousness has been suggested as a potential influence when comparing paper and Web-based surveys by Joinson (1999), who noted that individuals more concerned with their public image may have a different social experience when on the Internet and may engage in different behaviors as a result compared to those less concerned about public image.

Individuals with a high level of public self-consciousness may not show response distortion when perceived anonymity is high—such individuals tend to become cautious with how they present themselves only when responses could potentially be verified (Doherty &
Schlenker, 1991). When taking a survey, anonymity threats can serve as a social cue by prompting the perception that others can readily link surveys back to individual respondents. Consequently, a person who scores high on a measure of public self-consciousness should have higher ratings of impression management when perceived anonymity threats (i.e., social cues) are present than those who score low on public self-consciousness.

On the surface, impression management and public self-consciousness may appear to have a relation that would confound the investigation of both variables in a single study. The constructs of public self-consciousness and impression management have been found to be similar in their influence on behavior (Davies, 1985). However, Turner, Scheier, Carver, and Ickes (1978) found that public self-consciousness and social desirability were not significantly correlated, indicating that the two variables are distinct. Froming and Carver (1981) found similar results in a study with multiple samples that included public self-consciousness and social desirability measures. Findings such as these would suggest that “public self-consciousness is not synonymous with social desirability” (Scandell, 1998, p. 580). Still, under certain circumstances, respondents who are high in public self-consciousness may use self-presentation in an attempt to gain social approval and prevent negative evaluations by others (Doherty & Schlenker, 1991).

Overall, the literature suggests that public self-consciousness can lead to more conformity (Froming & Carver, 1981), promote socially desirable behavior in group environments (Abrams & Brown, 1989), and can potentially lead to the development of socially desirable response sets. Thus, there are reasons to expect public self-consciousness to influence how individuals may respond to anonymity threats when completing a survey.
Hypothesis 3: Public self-consciousness will moderate the relationship between perceived anonymity and impression management such that low perceived anonymity will encourage more impression management among those high in dispositional public self-consciousness compared to those low in public self-consciousness.

Influence of Survey Modality and Access Controls on Impression Management

As predicted by this study’s hypotheses, various survey modalities (i.e., paper-and-pencil, Web without access control, Web with group and individual access controls) are expected to affect anonymity perceptions. Since there is reason to believe that anonymity perceptions will influence impression management, modality is expected to yield group differences for ratings of impression management as well.

Over the years, research has attempted to answer the question of what survey formats are more likely to elicit socially desirable response distortion. Even though researchers have sought to establish a relationship between survey modality and response candor, the evolving nature of computer technology may render previous conclusions suspect. To date, no studies have examined the interaction of survey medium and impression management while also considering access controls.

Past research concerning the influence of survey modality on impression management has found conflicting results. A study by Lautenschlager and Flaherty (1990) found that ratings of impression management were higher in surveys when the respondent completed a computerized questionnaire compared to a paper-and-pencil version administered in either individual or group settings. The effect of survey modality on impression management was
also examined in a study by Booth-Kewley et al. (1992). However, Booth-Kewley et al. (1992) found no difference between computerized and paper-and-pencil survey modalities, citing differences between study samples and methodologies as potential sources of a null result for survey modality. Martin and Nagao (1989) found that a computer-based questionnaire yielded lower levels of impression management compared to paper-and-pencil. Similarly, a study by Joinson (1999) found that participants answering a Web-based survey rated lower on social desirability and social anxiety than those participants who completed the same survey on paper.

An attempt to quantitatively summarize of the effects of survey modality on impression management can be found in the results of a meta-analysis conducted by Richman et al. (1999), which compared thirty years worth of studies on questionnaire modalities and concluded that the summary of findings were inconclusive on which medium (i.e., computer vs. paper) leads to more socially desirable responding. However, Richman et al.’s (1999) compilation of research studies did not include any experiments conducted after 1997, which would arguably preclude the majority of investigations into Web-based surveys. Overall, the inconsistencies in past research highlight the need for additional work designed “to better determine when and for whom computers increase, decrease, or have no effect on socially desirable responding” (Booth-Kewley et al., 1992, p. 565).

There are reasons to question the degree to which older studies examining computer-based surveys generalize to today’s Web-based modality. Research by Rosenfeld et al. (1996) confirms that not all computer-based surveys necessarily invoke the same level of impression management. Rosenfeld et al. (1996) conducted a study with 247 Navy recruits
that considered the effects of anonymous versus identified survey conditions along with three types of modalities: traditional paper-and-pencil, computerized, and a networked computer modality. The results of their study showed that when respondents were identified and completing a survey on a computer that was known to be linked with at least one other computer, significant levels of response distortion existed. For traditional versus computerized survey modalities, no significant difference in response distortion was found for respondents in anonymous or identified conditions. The researchers postulated that the potential for the verification of information lay at the root of their findings, such that when survey respondents provided PII and knew that their identity could be traced (e.g., via a networked computer), ratings of impression management were significantly higher.

Rosenfeld et al. (1996) concluded that high levels of socially desirable responding were not necessarily inevitable when using computer surveys, since the authors did not find comparably high levels of response bias in computer conditions where the computer was not networked. Therefore, in survey conditions which are Web-based, which necessitates a vast network of connections to other computers, it follows that ratings of impression management are likely to be relatively high.

To date, little research has moved beyond the computer modality in general to identify whether the Internet survey modality and associated features such as access controls influence impression management. The present study addresses this gap in the literature. As stated earlier, it is expected that the various survey conditions in the present study will yield different perceptions of anonymity. Due to the theoretical linkage between perceived anonymity and impression management, this effect should in turn produce main effects on
measures of impression management. For Web-based surveys with individually-specific access controls, where the lowest amount of perceived anonymity is hypothesized, impression management should be greatest. Conversely, paper surveys are expected to yield the least impression management because anonymity perceptions should be highest in this condition.

Hypothesis 4: Survey modality will affect impression management such that impression management will be lowest for paper surveys, followed by Web-based surveys without access controls, Web-based surveys with group access controls, and Web-based surveys with individual access controls, respectively.

Figure 1 provides a visual representation of this prediction and the other hypotheses tested in this study.

Method

Participants

The participants for this study were 322 undergraduate students enrolled in an introductory psychology course at a large Southeastern university. Participants volunteered for the study to gain course credit. With regard to gender and age, 65% of the sample was female, and the average age of participants was 18.8 years ($SD = 2.04$). With regard to ethnicity, 9% of the sample was African American, 5% was Asian American, 77% was Caucasian, 3% was Hispanic, 1% was Native American, and 5% reported their ethnicity as “other.” With regard to class standing, 69% of the sample was freshmen, 20% was sophomores, 6% was juniors, 3% was seniors, and 1% reported their class standing as “other.” Respondents in all conditions volunteered to participate in the study via an
electronic recruitment Website maintained by the psychology department of the university from which the sample was drawn.

Design

This study used a between-groups design which included one independent variable, survey format, with four levels: paper-and-pencil, Web-based with no access controls, Web-based with group access controls, and Web-based with individual access controls. One continuous variable, perceived anonymity, served as a dependent variable for the first hypothesis and a predictor variable for the second and third hypotheses. A second continuous variable, impression management, served as a dependent/criterion variable for the second, third, and fourth hypotheses. Finally, a third continuous variable, public self-consciousness, was included as a moderator variable in the third hypothesis.

Procedure

Participants were presented with an html page containing informed consent materials after volunteering to take part in this study (see Appendix A). No identifying information was collected on the informed consent form. After checking a box to give their consent electronically, participants were randomly assigned to one of the four survey conditions via a Javascript control embedded in the informed consent html page. As detailed on the following pages, paper surveys were made available for participants in that condition to pick up, and links were provided to those who were randomly assigned to the electronic survey conditions. All participants were informed that their responses to the survey were anonymous.
**Paper-and-pencil modality.** After volunteering and giving consent to participate, respondents in the paper survey condition were given instructions to pick up a paper copy of the survey from an envelope located in an area that was easy to access (i.e., in a hallway within the same building in which respondents attend classes; see Appendix B). Participants retrieved blank surveys, independently and at their convenience, without interacting with a survey administrator or other individuals. The pick up site was accessible to students on weekdays from 8:00 a.m. to 10:00 p.m. The paper survey was administered on plain paper and asked respondents to circle an option from the response scale for each item. The appropriate response scale was presented following each item. The paper survey was accompanied by a stamped envelope in which the respondent mailed the finished survey back to the researcher at a university address. The instructions accompanying the paper survey then directed the respondent to access a Web page that contained debriefing information and an electronic name form field to complete to ensure course credit was assigned. Respondents in all four conditions were provided with identical debriefing information, which explained the intent of the study in detail and asked them not to discuss the study with others (see Appendix C).

**Web-based modality without access controls.** After volunteering and giving consent to participate, respondents in this Web-based condition were given a link to the survey materials (see Appendix D). No PIN was required to access the survey in this condition. Regardless of whether a PIN was required, the survey for all Web-based survey conditions was administered via a commercial online survey vendor that presented the items identically and in the same order as the paper format, with the appropriate response scale presented via
radio buttons following each item. A progress bar was visible in the Web-based survey to let participants know how close they were to completing the survey, comparable to the ability of participants in the paper-and-pencil condition to see how many physical pages of the survey they had remaining. Participants in all of the Web-based survey conditions were allowed to back-track and change responses as they would in the paper condition. After participants in all Web-based survey conditions completed the survey and submitted their responses, they were automatically directed to a page with debriefing information and an electronic name form field to complete to ensure course credit was assigned.

*Web-based modality with group access controls.* After volunteering and giving consent to participate, respondents in this Web-based condition were given a link to a Web page that provided them with a PIN to access the survey (see Appendix E). The respondents in this condition were informed that the PIN they were using to access the survey was shared with other students from their university and was being used to protect the integrity of their survey responses. Respondents were required to enter the PIN before beginning the survey, and were not permitted to continue with the survey if they did not enter the correct PIN. The rest of the survey was identical to the instrument administered in the Web-based modality without access control condition.

*Web-based modality with individual access controls.* After volunteering and giving consent to participate, respondents in this Web-based condition were given a link to a Web page that provided them with a PIN to access the survey (see Appendix F). The respondents in this condition were informed that the PIN they were using to access the survey was assigned on an individual basis and that their PIN was specific to their survey. Respondents
were required to enter the PIN before beginning the survey, and were not permitted to continue with the survey if they did not enter the correct PIN. It should be noted that in this survey condition, the PIN supplied to the participant was randomly selected from a subset of four PINs created for this condition, so while the survey still utilized an access control (i.e., an incorrect PIN would prevent access to the survey materials), the PINs were not actually unique identifiers of any individual participant. The rest of the survey was identical to the instrument administered in the other Web-based conditions described above.

Data collection was terminated after 90 paper surveys were picked up and 90 online surveys were completed within each of the Web-based survey conditions. An *a priori* power analysis was conducted using G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007) which indicated that for a sample size greater than 280, analyses utilizing an $F$ statistic with four conditions would have adequate statistical power at a value of 0.951 for $\alpha = .05$ to detect a medium effect size of 0.25 (see Cohen, 1988). Although this study was conducted through an online university experiment portal, an attempt to directly control the experimental surroundings was not made. This was done in an effort to add to the generalizability of the study by extrapolating to the varying respondent environments of field research, where the immediate surroundings of respondents completing Web-based surveys are often unable to be controlled. As such, participants assigned to the Web-based survey conditions were able to access the survey materials and complete them from any location they chose where they had Internet access on a computer.
Importantly, assignment to one of the four conditions did not change the content of the survey itself, but simply dictated characteristics of the survey medium and access control. The specific content of the questionnaire was adapted from pre-existing measures and concerned participants’ satisfaction with their course instructors and university climate. At the end of the survey, the public self-consciousness component of Scheier and Carver’s (1985) revised Self-Consciousness Scale (SCS), the impression management sub-scale of the Balanced Inventory of Desirable Responding (BIDR) (Paulhus, 1991), and a measure of perceived anonymity (Whelan, 2008) were completed by all respondents. The public self-consciousness component of the SCS was administered first after the participant completed the survey due to findings by Osberg (1985) that suggested an order effect when this scale is last in a serial administration of measures. Finally, demographic information was collected for each participant, and the name and student ID of each participant was requested for the purposes of assigning course credit for participation. This information was requested last in an attempt to prevent raising respondents’ suspicions about privacy assurances for any systematic reason other than the experimental manipulation. For all participants, names, ID numbers and other such forms of PII were not collected or stored in a way that would facilitate connecting the identity of any single respondent with their responses to the survey materials.

Measures

Impression management (20 items, $\alpha = .75$). For socially desirable responding, Paulhus’ (1991) scale of impression management from the Balanced Inventory of Desirable
Responding (BIDR) was used to gauge participants’ inclination to misrepresent themselves by distorting responses to survey questions. The items in the BIDR developed to assess self-deception were not used, as they have been found in past research to have little or no significance for examining response distortion in surveys (Fox & Schwartz, 2002; King & Miles, 1995; Lautenschlager & Flaherty, 1990; Lindeman & Verkasalo, 1995; Rosenfeld et al., 1996). The items in the impression management component of the BIDR were presented with a Likert-style scale, with scores ranging from 1 to 5 as to how true or untrue the participants feel each statement was as a description of themselves (see Appendix G). Example items from the impression management portion of the BIDR were, “I sometimes tell lies if I have to” (reverse scored), and “I always obey laws, even if I’m unlikely to get caught.”

The impression management scale from Paulhus’s (1991) BIDR was used in this study instead of the historically popular Marlowe-Crowne Social Desirability Scale (SDS, Crowne & Marlowe, 1960) due to the loading of the Marlowe-Crowne SDS on both self-deception and impression management factors (see Paulhus, 1991). While the BIDR correlates highly with the Marlowe-Crowne SDS (Paulhus, 1991), the BIDR was used due to the practical separation of items onto an impression management factor. As such, only items that addressed impression management were used instead of testing the more general tendency of socially desirable responding. The BIDR has been the preferred measure for detecting socially desirable responding for authors considering social desirability in recent research (e.g., Booth-Kewley, Larson, & Miyoshi, 2007; Brown & Treviño, 2006; Lalwani,
Shavitt, & Johnson, 2006; Oswald, Schmitt, & Kim, 2004), as well as earlier research relevant to this study (e.g., Booth-Kewley et al., 1992; Lautenschlager & Flaherty, 1990).

Perceived anonymity (9 items, α = .84). To assess perceptions of anonymity, Whelan’s (2008) measure of perceived anonymity was used. This measure is based on the definition of perceived anonymity presented earlier in this paper. Items assessed the extent to which respondents felt personally identified, and also incorporated aspects of being part of a larger anonymity set. Items asked respondents to indicate their level of agreement or disagreement using a Likert-style scale, with scores ranging from 1 to 5 (see Appendix H). Example items from this scale were, “I feel certain that this survey is anonymous,” and “I feel like part of the larger group of people who have taken this survey.”

Public self-consciousness (5 items, α = .84). Public self-consciousness was measured using the 5-item public self-consciousness component from Scheier and Carver’s (1985) revised Self-Consciousness Scale (SCS), which is a modification of Fenigstein et al.’s (1975) original SCS that has been adapted for more widespread use in general populations. The measure was presented with a Likert-style response scale, with scores ranging from 1 to 5 as to how well or poorly respondents feel each statement describes them (see Appendix I). Two items from the original SCS were deleted from the administered measure based on the findings of Burnkrant and Page (1984), which indicated that omitting the two items in question makes the instrument more sensitive and less likely to yield Type II error. Example items from this scale were, “I care a lot about how I present myself to others” and “I’m usually aware of my appearance.”
Satisfaction with course instructor and university climate (45 items). Scales concerning participants’ satisfaction with undergraduate psychology instructors and perceptions of university climate (adapted from Patterson, West, & Shackleton, 2005) were used to simulate a measure of relevant attitudes and opinions which parallel those commonly assessed in organizational research (see Appendices J and K). Responses to these items were not included in later analyses, as they are not directly relevant to the research hypotheses of the current study.

Demographic characteristics (4 items). Several items used to collect demographic information were included on the survey (see Appendix L). In particular, information concerning participants’ age, gender, ethnicity, and university class standing were collected to test and control for any inadvertent group differences between conditions on these characteristics.

Results

Sample Size and Data Cleaning

As indicated earlier, data collection was terminated after 90 paper surveys were picked up and 90 online surveys were completed. Manual counts permitted the determination of how many paper surveys were picked up and returned. For the paper condition, 69 surveys were returned for a response rate of 76.7%. This means that 21 people consented, picked up a paper survey, but then failed to mail it back. While tracking the number of completed electronic surveys was a straightforward exercise, limitations in the technology used to randomly assign participants to conditions prevented a determination of how many, if any, individuals consented but then failed to complete an electronic survey once the link was sent
to them. Since the total number of people receiving links was indeterminate, it was not possible to compute a response rate for the electronic survey conditions.

The surveys in all conditions were examined for missing data and extreme values. With regard to missing data, participants were removed from the database if they did not respond to any of the items contained in one or more of the measures collected in this study. With regard to extreme values, participants were removed if their scores were above 4.2 or below 1.6 for the impression management variable as suggested by outlier analysis; there were no outliers identified for the perceived anonymity or public self-consciousness variables. Overall, 13 participants were eliminated due to extreme values and/or missing data. The total number of usable surveys per condition was as follows: paper-and-pencil ($N = 66$), Web-based with no access controls ($N = 84$), Web-based with group access controls ($N = 88$), and Web-based with individual access controls ($N = 84$).

As shown above, the sample size was lowest in the paper-and-pencil group. This is unsurprising because a 90-survey *distribution* rule was used to terminate data collection in the paper-and-pencil condition whereas a 90-survey *return* rule was used to terminate data collection in the Web-based conditions. (Due to limitations in the technology indicated earlier, it was impossible to use a distribution rule to terminate data collection in the Web-based survey conditions.) Although the sample size was not equal across conditions, eliminating data to make the conditions equal would have resulted in omitting a total of 58 Web-based participants from subsequent analyses, as the paper condition had the lowest number of participants due to the survey collection process as described above. Therefore, all usable surveys were retained after data cleaning, resulting in a total sample size of 322.
Skewness and kurtosis values for all of the study variables included in this data set were within acceptable limits.

**Background Analyses**

Means, standard deviations, and intercorrelations for all variables in the study, including demographic variables, are presented in Table 1. Prior to conducting analyses corresponding to the research hypotheses, several parametric and non-parametric tests were conducted to explore the relationship between experimental condition, demographic characteristics, and the variables of interest to this study. Chi square analyses showed that there were no systematic demographic differences between participants assigned to the four conditions for the categorical variables of gender, $\chi^2(3, N = 322) = 1.27, p = .74$, university class standing, $\chi^2(12, N = 322) = 8.26, p = .77$, or ethnicity, $\chi^2(15, N = 337) = 10.58, p = .78$. An ANOVA showed that there were no differences between participants assigned to the four conditions for the continuous variable of age, $F(3, 313) = 0.76, p = .52$. ANOVAs and $t$-tests were conducted to determine if there were demographic differences on the criterion variables. Although gender was not related to ratings of impression management, $t = 1.03$, $p = .31$, it was related to perceived anonymity, $t = 3.36$, $p = .001$ with a mean perceived anonymity rating of 3.82 ($SD = 0.65$) for women and 3.56 ($SD = 0.66$) for men. Class standing was found to be significantly related to ratings of impression management, $F(4, 317) = 3.16, p = .01$; however, subsequent post hoc tests using a Bonferroni correction did not find significant differences between conditions for any class standing category. Class standing was not related to perceived anonymity, $F(4, 317) = 0.99, p = .41$. Ethnicity was found to be significantly different for perceived anonymity, $F(5, 315) = 4.27, p = .001$; again,
post hoc tests using a Bonferroni correction did not find significant differences between 
conditions for any ethnicity category. Ethnicity was not related to ratings of impression 
management, $F(5, 315) = 0.90, p = .45$. Pearson correlations were also computed to identify 
any possible relationships between age and the criterion variables measured in this study (see 
Table 1). No significant relationships were found.

To summarize, participants in the four conditions did not significantly differ with 
regard to their demographic characteristics. For the most part, the evidence did not indicate 
significant relationships between the demographic variables measured in this study and the 
criterion variables of interest. The exception was gender, which was significantly related to 
anonymity perceptions such that females tended to report higher levels of perceived 
anonymity. Therefore, gender was used as a statistical control in tests of the hypotheses 
involving perceived anonymity.

*Hypothesis Tests*

Table 2 provides the means and standard deviations per condition for the criterion 
variables of interest. Hypothesis 1 predicted that anonymity perceptions would differ by 
survey condition. To test this hypothesis, an ANCOVA was conducted. Gender was entered 
as a covariate, as initial analyses described above found a significant between-groups effect 
for this variable on perceived anonymity. The results of the ANCOVA were not significant, 
$F(3, 317) = 0.69, p = .56$. Therefore, there were no significant differences between the 
conditions for ratings of anonymity perceptions. Further, as shown in Table 2, there was no 
logical pattern between conditions for mean levels of perceived anonymity. These results 
suggest that participants in these four conditions do not significantly differ from one another
in their perceptions of the anonymity afforded to them regardless of the manipulations of survey administration. Thus, Hypothesis 1 was not supported.

For Hypothesis 2, it was predicted that perceptions of anonymity would be negatively related to ratings of impression management. To test Hypothesis 2, a partial correlation was computed between perceived anonymity and ratings of impression management, controlling for gender, \( r(319) = .06, p = .26 \). Results were nonsignificant; thus, Hypothesis 2 was not supported.

For Hypothesis 3, it was predicted that public self-consciousness would moderate the relationship between anonymity perceptions and ratings of impression management. To test Hypothesis 3, a moderated hierarchical regression analysis was employed. Two blocks of variables were entered into the analysis, with impression management as the criterion variable. In the first step, gender was entered as a control variable. In the second step, measures of perceived anonymity, public self-consciousness and an interaction term (i.e., the interaction between public self-consciousness and perceived anonymity) were added to test for moderation in accordance with Baron and Kenny’s (1986) protocol for moderated regression analysis. The predictor variables in the regression analysis (i.e., perceived anonymity and public self-consciousness) were mean-centered prior to the regression analysis to reduce the potential effects of multicollinearity as suggested by Aiken and West (1991). A summary of the results of the hierarchical regression can be found in Table 3.

The overall model for the regression analysis was nonsignificant, \( R^2 = 0.026, F(4, 316) = 2.10, p = .08 \). Public self-consciousness was a significant predictor of impression management (see Table 3). The interaction term was not significant, which suggests that the
moderation of a relationship between perceived anonymity and impression management did not occur (Baron & Kenny, 1986). However, as Hypothesis 2 was not supported, it would be expected that Hypothesis 3 would also not be supported. Even though public self-consciousness was a significant predictor of impression management, it is plausible that the hypothesized effect would be unlikely to be found since the relationship between perceptions of anonymity and impression management was nonsignificant. It is also worth noting that those with high impression management scores were unlikely to endorse the public self-consciousness items, as indicated by the significant negative relationship between these two variables, as shown in Table 1. Perhaps individuals rating high on impression management are unlikely to admit to being publicly self-conscious.

For Hypothesis 4, it was predicted that mean ratings of impression management would differ by survey condition. The results of the ANOVA were not significant, $F(3, 318) = 0.95, p = .42$. Therefore, there were no significant differences between conditions for ratings of impression management. Further, as shown in Table 2, there was no logical pattern between conditions for mean levels of impression management. These results suggest that participants in these four conditions do not significantly differ from one another in their propensity to intentionally distort their responses to a survey. Thus, Hypothesis 4 was not supported.

Discussion

This study sought to add to the literature that examines the relationship between survey characteristics and anonymity. In defining and operationalizing anonymity as a subjective perception, this study attempted to derive an approach towards examining survey
anonymity that can better take into account unforeseen threats to survey privacy which can lead to respondent behaviors such as active nonresponse (Thompson & Surface, 2007). As noted by Paine et al. (2007), individuals may be concerned about information privacy for a variety of reasons that are not typically addressed in privacy research. Therefore, examining the relationship between the anonymity a researcher or practitioner designs into a survey methodology and the perceptions of respondents to that survey can serve to elucidate some of the circumstances under which there may not be a strong correspondence between reality and perceptions. Moreover, considering the possible relationship between anonymity and impression management contributes to the rationale for approaching anonymity from a subjective perspective, rather than merely assuming that the objective anonymity afforded by a survey design or administration environment is sufficient to curtail response distortion. Lastly, this study adds to a growing literature that considers Web-based survey administration, which is an area of research that can be considered to be in relative infancy (Barak & English, 2002).

While the results of this study did not support the hypotheses, the implications of the relationship between perceived anonymity and different survey conditions are informative to researchers and practitioners utilizing surveys to collect data. To summarize, this study considered different survey modality (i.e., paper and Web) as well as variations related to access controls within Web-based surveys. Ratings of perceived anonymity were not found to be significantly different across groups, which implies that while researchers and practitioners may think they are making meaningful changes by altering attributes of the way
an instrument is administered, these changes may not influence the perceptions of survey respondents.

Moreover, despite the manipulations of modality and access controls, respondents reported relatively high levels of perceived anonymity across these experimental levels. The average scale score of 3.73 on the perceived anonymity measure indicates that respondents in all conditions somewhat agreed, in the parlance of the response options, that the survey they were taking was somewhat anonymous. An obvious question would be whether or not respondents understand the difference between anonymity, specific to the survey they completed, and confidentiality as it is required to be explained by ethical research practices of informed consent. However, a study by Whelan (2007) showed that survey respondents do comprehend the difference between the concepts of anonymity and confidentiality. Therefore the findings of the present study may simply reflect respondents’ belief in the anonymity assurances made to them, for which manipulations of the survey administration did not serve as a social cue that would systematically make some individuals less likely to see their responses as anonymous. The results of this study suggest, in line with the findings of studies such as Hartnett and Seligsohn (1967), that characteristics of the survey itself may be less important than previously thought in influencing how anonymous a respondent feels.

This study also informs the more theoretical question of the meaning of anonymity in survey research. Often research is consciously designed to include methodological features meant to ensure anonymity. However, the design does not necessarily ensure that the survey will be responded to in a manner consistent with those information protections. Information privacy cannot be unraveled from the larger sociocultural context of how individuals
interpret and understand their own anonymity in a subjective, rather than objective, conceptualization (Dourish & Anderson, 2006). The impact of anonymity, therefore, might best be researched through examinations of the social nature of this construct, as individuals transmitting information through an objectively anonymous survey may not feel completely socially anonymous, and not all individuals may seek or correctly interpret cues in their environment related to threats to anonymity (Hayne & Rice, 1997).

Contrary to Hypothesis 4, the survey conditions employed in the design of this study did not yield significant group differences in ratings of impression management. This implies that the survey medium and the use of access controls may not affect the likelihood that a respondent will engage in response distortion. Instead, when a salient threat to anonymity is present, this threat may be the contributing factor that influences respondent perceptions and potentially leads to response distortion (e.g., Dunnette & Heneman, 1956). If respondents do not perceive a threat to their anonymity, or have no reason to suspect that their identity could be tracked or compromised, they may not attend to factors related to the administration of a survey that researchers have otherwise thought to be detrimental to eliciting candid responses.

The lack of support for Hypothesis 2 suggests that as people feel less anonymous, they are not significantly more likely to distort their responses. Given the evaluative nature of impression management and the impact that anonymity theoretically has on concerns about social evaluations, this result was surprising. The basis for a considerable portion of the research on survey privacy rests on the assumption that the more anonymous an individual feels, the more honest he or she will be; and the more an individual is individuated and
identified, the more likely he or she will be to distort responses in a socially desirable manner. While this assumption has a valid parallel in the deindividuation literature of social psychology (e.g., Zimbardo, 1969), the same pattern might not necessarily exist in the specific context of survey research. As this study is an empirical investigation of perceived anonymity measured between individuals, for which experimental conditions of anonymity are often a proxy, the results may lend insight into one of the previously unexamined, though not ignored, potential influences on survey respondents’ response decisions.

There might possibly be something unique about the sophistication of Web-based survey administration and what type of social cues the Internet evokes that researchers are still in the process of clarifying. For instance, Booth-Kewley et al. (2007) concluded that the computer administration of surveys in and of itself creates a social situation in which some individuals may feel anonymous and will then be less inhibited in their responses. As researchers and practitioners continue to utilize the Internet to deliver surveys, it is possible that respondents have acclimated to the potential Web-specific threats to anonymity and feel little apprehension about completing a Web-based survey. Therefore, it may be the fact that some of the differences between paper and Web-based surveys are no longer significant depending on the context and circumstances. Identifying those circumstances is a challenge for further inquiry into the construct of perceived anonymity.

**Practical Implications**

Acknowledging that one cannot legitimately accept a null hypothesis of “no difference,” the similarity across the conditions examined in this study is noteworthy, given the previously described *a priori* statistical power calculation. If indeed survey modality and
access controls do not affect perceived anonymity and impression management, then survey practitioners and organizational decision makers should take notice. To some extent, this would mitigate concerns that anonymity apprehensions and candor may vary across survey modality when organizational constraints (e.g., certain employees without computer access) require employers to administer opinion surveys in multiple formats (e.g., paper and Web) simultaneously.

With regard to access controls, this research helps allay suspicions that access controls, which can be used to prevent people from submitting their responses multiple times, could threaten anonymity perceptions and candor. Thompson et al. (2003) described a case study in which an organization transitioning its personnel survey from paper to the Internet decided against access controls, fearing that passcodes would cause employees to question anonymity assurances. Moreover, Stanton (1998) has stated that the “use of passwords or access keys… creates the potential for elevating respondents’ suspicions about anonymity and confidentiality” (p. 711). As the first known test to examine the effects of access controls on perceived anonymity and impression management, this study suggests that concerns associated with this practice may be unfounded. To the extent that this trend generalizes to other settings and surveys, practitioners will be able to use survey PINs and access controls with some assurance that they will not produce the detrimental effects previously imagined.

Limitations and Future Research

Despite the contributions of this study, it has several limitations that should be noted. First, the use of undergraduate students as a research sample may limit its generalizability. In an organizational sample, the anonymity perceptions of a survey respondent might be
dependent on other variables not typically present in university research, such as the use of computer monitoring or video surveillance by an employer. In general, organizational environments tend to be significantly more complex and variable (e.g., Cannon & St. John, 2007) than a laboratory setting. Importantly, the present study did not occur in a laboratory. It did not control for respondent context in an attempt to mimic applied survey contexts. Nevertheless, the findings may not generalize to all survey situations. The participants in this study may have been more likely to trust the anonymity assurances made to them compared to a sample of employees drawn from an organization, as there may have been fewer external threats that could compromise an individual’s identity and make social evaluation salient in the laboratory context. Conversely, it could be that because the participants were aware that the survey was part of a university research project, they trusted the anonymity assurances made to them. Indeed, a phone survey of 1200 Internet users by Turow and Hennessy (2007) found that the majority of Internet users believe that institutions take measures to ensure information privacy. While the same study also found that many people believe institutions and organizations will disclose personal information to third parties, this suspicion may be mitigated in a research context by informed consent procedures that clearly dictate how information would be aggregated and reported to any third party.

Another possible limitation to this study’s external validity involves the content of the questionnaire. The use of an instructor evaluation and university climate questionnaire, while similar to the type of supervisor and organizational satisfaction measures commonly used in work settings, may not have been perceived as information that respondents felt was private enough to warrant being concerned about their anonymity. Consequently, the lack of support
for the hypotheses in the present study may be due to the fact that respondents to the survey did not perceive that answering questions about their instructor held any consequence if they provided negative responses. Said another way, people filling out surveys about mundane or non-sensitive topics may be inclined to believe that no one would care enough about how only one individual respondent answered to try to track people down. Perceptions of anonymity afforded by surveys containing highly sensitive topics may, however, be more sensitive to modality manipulations. In the extant literature, particular attention has been paid to how respondents treat sensitive survey content (e.g., Couper, Singer, & Tourangeau, 2003; Joinson, Woodley, & Reips, 2007; Ong & Weiss, 2000; Rasinski, Willis, Baldwin, Yeh, & Lee, 1999). A sensitive survey item can be conceptualized as including three components related to the intrusiveness of the item content, the threat of potential consequences for responding to the item, and the social undesirability of a respondent’s answer to the item (Tourangeau & Yan, 2007). In the present study, the items pertaining to a participant’s instructor and his or her assessment of climate may not have met the aforementioned conditions to be considered sensitive.

In short, it is plausible that the use of survey content that is more unambiguously sensitive to the majority of respondents may yield a different pattern of results than those seen in the current study. Future research should examine the effects of more sensitive survey content such as drug use, which may be more likely to elicit response distortion, to further examine the influence of access controls and survey modality on perceived anonymity and impression management.
References


Roztocki, N., & Lahri, N. A. (2003). Is the applicability of Web-based surveys for academic research limited to the fields of information technology? In *Proceedings of the 36th*


*Personnel Psychology, 51,* 709-725.


Whelan, T. J. (2007). *Anonymity and confidentiality: Do survey respondents know the difference?* Poster presented at the 30th annual meeting of the Society of Southeastern Social Psychologists, Durham, NC.


Footnotes

1 It should be noted that discussing paper-and-pencil surveys generically can refer to one of many different types of paper and pencil surveys—in the current study, nonidentified paper-and-pencil surveys will be utilized to provide an analogue to the nonidentified Web-based surveys also under investigation. That is, the paper-and-pencil survey used in this study does not ask for identifying information and does not include codes which could identify the respondent and/or the group to which he or she belongs.
Appendices
Appendix A

INFORMED CONSENT FORM for RESEARCH

Title of Study: Personality Traits and Satisfaction with Course Instructors & University Climate

Principal Investigator: Thomas Whelan  Faculty Sponsor: Dr. Lori Foster Thompson

We are asking you to participate in a research study. The purpose of this study is to examine how personality traits relate to an individual’s assessment of their instructor and the university climate. Please read the following sections carefully. You must acknowledge that you have read this material by marking check boxes below. If you do not mark all of the check boxes, you will not be able to continue.

INFORMATION
If you agree to participate in this study, you will be asked to fill out a survey asking questions about you. You will be asked to complete a questionnaire about how satisfied you feel as a student, followed by several questionnaires that ask you about how you felt while taking the survey. This study should take forty-five minutes or less to complete.

☐ Check here to acknowledge that you have read this section.

RISKS
None foreseeable.

POTENTIAL BENEFITS
This study will benefit you by giving you insight into how research surveys are designed and administered.

CONFIDENTIALITY
The information in the study records will be kept strictly confidential. Your responses to the survey will be anonymous. Only the principal investigator and Dr. Thompson will have access to the data you generate. All results will be reported in aggregated format (i.e., as averages). Data will be stored securely in a password-protected computer. Under no circumstance will any individual participant be identified in a publication or presentation describing this study. ☐ Check here to acknowledge that you have read this section.

COMPENSATION
For participating in this study you will receive 2 experiment credits. If you withdraw from the study prior to its completion, you will receive no credit for participation. Other ways to earn the same amount of credit are at the discretion of your course instructor. You will receive no monetary compensation for participating in this study.

CONTACT

65
If you have questions at any time about the study or the procedures, you may contact the researcher, Mr. Thomas Whelan, at 919.513.3417 or tjwhelan@ncsu.edu. If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Dr. David Kaber, Chair of the NCSU IRB for the Use of Human Subjects in Research Committee, Box 7514, NCSU Campus (919/515-3086) or Mr. Matthew Ronning, Assistant Vice Chancellor, Research Administration, Box 7514, NCSU Campus (919/513-2148). □ Check here to acknowledge that you have read this section.

PARTICIPATION
Your participation in this study is voluntary; you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits to which you are otherwise entitled. □ Check here to acknowledge that you have read this section.

CONSENT
“I have read and understand the above information. I agree to participate in this study with the understanding that I may withdraw at any time.”

By clicking “Submit,” you are giving your consent to participate in this study.
Appendix B

PAPER SURVEY INSTRUCTIONS

The enclosed paper survey is part of experiment #1257. Your responses to the items in this survey are completely anonymous. Therefore, please refrain from writing your name or other identifying information on the survey itself or any of these materials. If you have not first signed up for this experiment via Experimetrix (http://experimetrix2.com/ncsu) please do not complete this survey.

Please read each question on the enclosed survey carefully and answer each item according to the response options for each question. After completing the survey in its entirety, seal it in the provided envelope, and return the survey to the researcher via mail. *Do not include this page in the envelope.*

When you have sealed the envelope, please visit http://www4.ncsu.edu/~tjwhelan/asdrm/debrief.html for further instructions on how to receive experiment credits for participating in this study.

Thank you for participating in this research study.
Appendix C
North Carolina State University
DEBRIEFING FORM

Title of Study: Personality Traits and Satisfaction with Course Instructors & University Climate

Principal Investigator: Thomas Whelan
Faculty Sponsor: Dr. Lori Foster Thompson

You have now completed participation in this research study. The actual premise of this study was not to investigate the relationship between personality and reports of satisfaction; instead, the true purpose of this study was to test how different types of survey formats affect anonymity perceptions. Your responses cannot be traced to your identity in any way, and the data have been recorded in a manner that provides you with total anonymity.

Again, your name was recorded in a way that makes it impossible to connect your responses to items on the survey to your identity. Your responses to the survey you just completed are completely anonymous, and the record of your name will be used only to assign experiment credits. The information in the study records will be kept strictly confidential. Only the principal investigator and Dr. Thompson will have access to the data you generate. Under no circumstance will any individual participant be identified in a publication or presentation describing this study.

CONTACT
If you have questions at any time about the study or the procedures, you may contact the researcher, Mr. Thomas Whelan, at 919.513.3417 or at tjwhelan@ncsu.edu. If you feel you have not been treated according to the descriptions in the informed consent form, or your rights as a participant in research have been violated during the course of this project, you may contact Dr. David Kaber, Chair of the NCSU IRB for the Use of Human Subjects in Research Committee, Box 7514, NCSU Campus (919/515-3086) or Mr. Matthew Ronning, Assistant Vice Chancellor, Research Administration, Box 7514, NCSU Campus (919/513-2148).

Thank you for giving your time and effort to help us conduct this research!
Appendix D

WEB SURVEY INSTRUCTIONS, NO PIN

The following survey is part of experiment #1257. Your responses to the items in this survey are completely anonymous. Therefore, please refrain from typing your name or other identifying information into the survey.

Please read each question on this survey carefully and answer each item according to the response options for each question. When you have completed the survey, please submit your answers and follow the instructions provided at the end of the survey to ensure receipt of experiment credit.

Thank you for participating in this research study.
Appendix E

WEB SURVEY INSTRUCTIONS, GROUP PIN

The following survey is part of experiment #1257. Your responses to the items in this survey are completely anonymous. Therefore, please refrain from typing your name or other identifying information into the survey.

Please read each question on this survey carefully and answer each item according to the response options for each question.

To access this survey, you will be required to enter a PIN. The PIN for your survey is:

    XXXX

You will need this PIN to be granted access to the survey. Please note that this PIN is also being used by the other participants from your university who have volunteered for this study. This is to prevent others who are not in the experiment from accessing the survey without authorization. Because this PIN is specific to your university, please do not allow other people outside of your university to use it to access the survey.

When you have completed the survey, please submit your answers and follow the instructions provided at the end of the survey to ensure receipt of experiment credit.

Thank you for participating in this research study.
Appendix F

WEB SURVEY INSTRUCTIONS, INDIVIDUAL PIN

The following survey is part of experiment #1257. Your responses to the items in this survey are completely anonymous. Therefore, please refrain from typing your name or other identifying information into the survey.

Please read each question on this survey carefully and answer each item according to the response options for each question.

To access this survey, you will be required to enter a PIN. The PIN for your survey is:

XXXX

You will need this PIN to be granted access to the survey. Please note that this PIN is specific to your individual survey and is not being used by other participants who have volunteered for this study. This is to prevent others who are not in the experiment from accessing your survey without authorization. Because this PIN is specific to your individual survey, please do not allow other people to use it to access the survey.

When you have completed the survey, please submit your answers and follow the instructions provided at the end of the survey to ensure receipt of experiment credit.

Thank you for participating in this research study.
Appendix G

Impression Management Items

Using the scale below as a guide, indicate for each statement how much you feel the statement is true or false as it applies to you.

1 = definitely false
2 = mostly false
3 = equally true and false
4 = mostly true
5 = definitely true

1. I sometimes tell lies if I have to.a
2. I never cover up my mistakes.
3. There have been occasions when I have taken advantage of someone.a
4. I never swear.
5. I sometimes try to get even rather than forgive and forget.a
6. I always obey laws, even if I’m unlikely to get caught.
7. I have said something bad about a friend behind his or her back.a
8. When I hear people talking privately, I avoid listening.
9. I have received too much change from a salesperson without telling him or her.a
10. I always declare everything at customs.
11. When I was young I sometimes stole things.a
12. I have never dropped litter on the street.
13. I sometimes drive faster than the speed limit.a
14. I never read sexy books or magazines.
15. I have done things that I don’t tell other people about.a
16. I never take things that don’t belong to me.
17. I have taken sick-leave from work or school even though I wasn’t really sick.a
18. I have never damaged a library book or store merchandise without reporting it.
19. I have some pretty awful habits.a
20. I don’t gossip about other people’s business.

a reverse-scored items
Appendix H

Perceived Anonymity Items

Using the scale below as a guide, indicate for each statement how much you agree or disagree with the statement as they relate to the survey you just completed.

1 = strongly disagree
2 = somewhat disagree
3 = neither agree nor disagree
4 = somewhat agree
5 = strongly agree

1. I feel my responses are indistinguishable from the responses of others that have taken this survey.
2. It would be impossible to trace my responses to this survey back to me.
3. I feel like part of the larger group of people who have taken this survey.
4. I feel that my responses are unidentifiable from the responses of others.
5. My responses will blend in with the responses of other people.
6. I feel certain that this survey is anonymous.
7. If someone saw my responses, they would never know who it was who filled out the survey.
8. I feel that my identity is protected by this survey.
9. No one could tell that I took this survey if they got hold of my responses.
Appendix I

*Public Self-Consciousness Items*

Using the scale below as a guide, indicate for each statement how much you feel it describes you.

1 = not at all like me  
2 = a little like me  
3 = somewhat like me  
4 = moderately like me  
5 = a lot like me

1. I’m concerned about my style of doing things.  
2. I care a lot about how I present myself to others.  
3. I’m self-conscious about the way I look.  
4. I usually worry about making a good impression.  
5. I’m concerned about what other people think of me.
Appendix J

Satisfaction with Course Instructor

Please think about the experiences you have had so far this semester with the instructor teaching the PSY 200 (Introduction to Psychology) course you are currently taking. Using the scale below as a guide, indicate for each statement how much you agree or disagree with the statement.

1 = strongly disagree
2 = somewhat disagree
3 = neither agree nor disagree
4 = somewhat agree
5 = strongly agree

1. The instructor stated course objectives/outcomes.
2. The instructor was receptive to students outside the classroom.
3. The instructor explained difficult material well.
4. The instructor was enthusiastic about teaching the course.
5. The instructor was prepared for class.
6. The instructor gave prompt and useful feedback.
7. The instructor effectively used instructional technology.
8. The instructor consistently treated students with respect.
9. Overall, the instructor was an effective teacher.
10. The course readings were valuable aids to learning.
11. The course assignments were valuable aids to learning.
12. This course was intellectually challenging and stimulating.
13. This course improved my knowledge of the subject.
14. Overall, this course was excellent.
Appendix K

*University Climate Measure*

Please think about the experiences you have had at this university. Using the scale below as a guide, indicate for each statement how true or false you consider each statement to be.

1 = definitely false
2 = mostly false
3 = equally true and false
4 = mostly true
5 = definitely true

*Instructor Support*

1. Instructors here are really good at understanding peoples’ problems.
2. Instructors show that they have confidence in those they teach.
3. Instructors here are friendly and easy to approach.
4. Instructors can be relied upon to give good guidance to people.

*Welfare*

1. This university pays little attention to the interests of students.\(^a\)
2. This university tries to look after its students.
3. This university cares about its students.
4. This university tries to be fair in its actions towards students.

*Formalization*

1. It is considered extremely important here to follow the rules.
2. People can ignore formal procedures and rules if it helps get the job done.
3. Everything has to be done by the book.
4. It’s not necessary to follow procedures to the letter around here.\(^a\)
5. Nobody gets too upset if people break the rules around here.\(^a\)

*Clarity of University Goals*

1. Students have a good understanding of what the university is trying to do.
2. The future direction of the university is clearly communicated to everyone.
3. Students aren’t clear about the aims of the university.\(^a\)
4. Everyone who studies here is well aware of the long-term plans and direction of this university.
5. There is a strong sense of where the university is going.
**Effort**

1. Students here always want to perform to the best of their ability.
2. Students are enthusiastic about their coursework.
3. Students here get by with doing as little as possible.\(^a\)
4. Students are prepared to make a special effort to do a good job.
5. Students here don’t put more effort into their studies than they have to.\(^a\)

**Pressure to Produce**

1. Students are expected to do too much in a day.
2. In general, students’ course loads are not particularly demanding.\(^a\)
3. Instructors require students to work extremely hard.
4. Students here are under pressure to make satisfactory grades.
5. The pace of studies here is pretty relaxed.\(^a\)

\(^a\) reverse-scored items
Appendix L

Demographics Questionnaire

Please fill in the blank or circle the number that corresponds to your answer to the following questions.

1. What is your gender?
   0 = Female, 1 = Male

2. What is your class standing (according to credit hours earned)?
   1 = Freshman, 2 = Sophomore, 3 = Junior, 4 = Senior, 5 = Graduate Student, 6 = Other

3. What is your ethnicity?
   1 = African American, 2 = Asian American, 3 = Caucasian, 4 = Hispanic, 5 = Native American, 6 = Other

4. How old are you?
   ______ years

5. What is your major (or intended major)?
   __________________________________________
Figure 1

*Model of Hypothesized Relationships*
Table 1

*Means, Standard Deviations, and Intercorrelations*

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Public Self-Consciousness</td>
<td>3.49</td>
<td>0.89</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Impression Management</td>
<td>2.93</td>
<td>0.50</td>
<td>-.13*</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Perceived Anonymity</td>
<td>3.73</td>
<td>0.66</td>
<td>-.02</td>
<td>.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Gender&lt;sup&gt;a&lt;/sup&gt;</td>
<td>--</td>
<td>--</td>
<td>-.12*</td>
<td>-.06</td>
<td>-.19**</td>
<td>--</td>
</tr>
<tr>
<td>5. Age</td>
<td>18.76</td>
<td>2.04</td>
<td>-.08</td>
<td>.03</td>
<td>-.04</td>
<td>.01</td>
</tr>
</tbody>
</table>

*Note: N = 322, * p < .05, ** p < .01.*

<sup>a</sup> 0 = female, 1 = male
<table>
<thead>
<tr>
<th>Condition</th>
<th>Perceived Anonymity</th>
<th>Impression Management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$N$</td>
<td>$M$</td>
</tr>
<tr>
<td>1. Paper</td>
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<td>3.81</td>
</tr>
<tr>
<td>2. Web, no access control</td>
<td>84</td>
<td>3.69</td>
</tr>
<tr>
<td>3. Web, group access control</td>
<td>88</td>
<td>3.70</td>
</tr>
<tr>
<td>4. Web, individual access control</td>
<td>84</td>
<td>3.72</td>
</tr>
</tbody>
</table>
Table 3

*Summary of Hierarchical Regression Analysis for Variables Predicting Impression Management* <sup>a</sup>

<table>
<thead>
<tr>
<th></th>
<th>b</th>
<th>SE&lt;sub&gt;b&lt;/sub&gt;</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gender</td>
<td>-0.07</td>
<td>0.06</td>
<td>-0.07</td>
<td>-1.20</td>
<td>0.23</td>
</tr>
<tr>
<td>2. Perceived Anonymity</td>
<td>-0.04</td>
<td>0.04</td>
<td>-0.06</td>
<td>-1.03</td>
<td>0.31</td>
</tr>
<tr>
<td>3. Public Self-Consciousness</td>
<td>0.08</td>
<td>0.03</td>
<td>0.14</td>
<td>2.40</td>
<td>0.02</td>
</tr>
<tr>
<td>4. Interaction Term</td>
<td>-0.01</td>
<td>0.05</td>
<td>-0.01</td>
<td>-0.06</td>
<td>0.95</td>
</tr>
</tbody>
</table>

<sup>a</sup> For the regression model, \( R^2 = 0.026, F(4,316) = 2.10, p = .08 \)