Annu. Rev. Psychol. 2006. 57:529–55
doi: 10.1146/annurev.psych.57.102904.190048

First published online as a Review in Advance on August 11, 2005

# THE INTERNET AS PSYCHOLOGICAL LABORATORY

Linda J. Skitka and Edward G. Sargis
*Department of Psychology, University of Illinois at Chicago, Chicago, Illinois 60607-7137; email: lskitka@uic.edu, esargis@uic.edu*



**Key Words** Internet, methods

■ **Abstract** This chapter reviews studies published in American Psychological Association (APA) journals from 2003–2004 and additional studies (received in response to listserv requests) that used the Internet to collect data (N = 121 total studies). Specific examples of three kinds of Web-based research are reviewed: (*a*) translational (established methods and research questions are adapted to the Web), (*b*) phenomenological (behavior on the Web is the focus of study), and (*c*) novel (methodologically innovations unique to Web-based research). Among other findings, our review indicated that 21% of APA journals published at least one article that reported on Web-based research, most Web-based psychological research uses experimental methods, a surprising number use college student samples, and deception in Web-based research is not uncommon. Strengths and weaknesses of Web-based psychological research in general, and our sample of studies in particular, are reviewed with special attention to possible concerns about sampling and the use of deception.

## CONTENTS

## INTRODUCTION

Just as the Internet has facilitated surprising new developments in political organizing, making money, discovering lost relatives, receiving medical advice, and finding the perfect recipe for anything from a pie to a bomb, the Internet has also opened new horizons to traditional data collection methods in psychology. Suddenly collecting data is as easy as posting a form, and samples of overt racists, pet owners, depressives, or members of any other demographic, social, or psychological category are as easy to reach and use in one's research as are members of college student subject pools.

Previous *Annual Review of Psychology* chapters devoted to the Internet have reviewed (*a*) the nuts and bolts of how to collect data using the Internet, such as getting started with HyperText Markup Language (HTML) forms, client and server side programming, and how to handle issues such as subject recruitment and multiple submissions (Birnbaum 2004), and (*b*) the psychological impact of the Internet on people's well-being and social relationships (Bargh & McKenna 2004). Other excellent resources have recently become available that provide additional guidance on getting started doing psychological research using the World Wide Web, such as a number of books that provide excellent how-to introductions (e.g., Birnbaum 2000, Fraley 2003). Research on best practices and methods in Web research is also booming, leading to the development of Web archives devoted to facilitating access to up-to-date information on Web survey methodology (WebSM). WebSM has archived study reports of mode comparisons, meta-analyses of response rates associated with different methods of participant recruitment, the effectiveness of different incentives, the reliability of slider as compared to click-button scales, and much more (see http://www.websm.org). The Pew Internet and American Life Project provides continuously updated reports that explore the impact of the Internet on families, communities, work and home, daily life, education, and health care, as well as civic and political life. It releases 15–30 research reports a year and

has emerged as the authoritative voice on how the Internet is affecting any given aspect of people's lives. In addition, it tracks the degree to which Internet access is reaching across different aspects of society (see http://www.pewinternet.org/).

In short, there are already significant resources available that summarize how to use the Internet in psychological research, best research practices for Web-based research, and the impact of the Internet on many aspects of psychological and social life. Therefore, our goal in this chapter is to take a different tack. Specifically, now that more psychological researchers know how to use the Web to collect data and appear to be doing so, it may be useful to review existing psychological research that is using the Web. What kinds of substantive questions are being addressed and what kinds of methods are being employed when psychological researchers turn to the Web to collect data? To form the foundation of our review, we collected a broad sample of articles from the mainstream psychological literature that reported on original empirical research and that used the Internet as the source of their data.



## METHOD

We examined all published articles in American Psychological Association (APA) journals for the years 2003–2004 for original empirical research that used the Internet as a data source to build an appropriate sample. In addition to allowing us to explore questions about what kind of psychological research is being done on the Internet, this sample of studies allowed us to infer the degree to which Internet-based research methods are penetrating research reported in the discipline's top journals.

To broaden our sample, we also posted requests for reprints and preprints of articles that reported on Internet-based psychological research on listservs associated with each of the major divisions of APA. Although these combined sampling strategies led us to identify probably only a fraction of the total number of psychological studies that have used Web-based methods, this approach nonetheless provided a basis for making descriptive estimates of how psychologists are using the Web in their research. As can be seen in Table 1, we identified a total sample of 84 articles that reported on 112 studies that were appropriate for our review.

**TABLE 1** Number of Internet-based studies identified through review of American Psychological Association (APA) journals and listserv solicitations

| Sampling strategy | Number of articles identified | Number of studies reported |
|---|---|---|
| Review of APA journals (2003–2004) | 22 | 31 |
| Listserv solicitation | 62 | 81 |
| Total number in the sample used in this review | 84 | 112 |

## HOW PREVALENT IS WEB-BASED RESEARCH IN APA JOURNALS?

One-fifth (21%) of all APA journals during 2003–2004 published at least one article that collected data using the Web. That said, the overall incidence of articles using Web-based research was relatively low. Out of 1401 articles published in APA journals in 2003 and 2004, 22 (1.6%) were articles that reported on Web-based research. Moreover, as can be seen in Table 2, the overall number of articles that reported on Web-based research published in any given APA journal did not exceed 3% in 2003–2004. In summary, although there is a clear presence of Web-based research in APA journals, the overall incidence in any given journal was relatively low.



**TABLE 2** American Psychological Association journals that published articles reporting on research conducted on the Web, total articles published during 2003–2004, and penetration of Web-based research

| Journal | Number of articles that reported Internet research 2003–2004 | Total number of articles published in 2003–2004 | Penetration (% of articles that reported on Internet research) |
|---|---|---|---|
| *Dreaming* | 1 | 47 | 2% |
| *Emotion* | 1 | 64 | 1% |
| *Health Psychology* | 1 | 137 | 1% |
| *Journal of Applied Psychology* | 6 | 178 | 3% |
| *Journal of Consulting and Clinical Psychology* | 2 | 208 | 1% |
| *Journal of Counseling Psychology* | 3 | 87 | 3% |
| *Journal of Experimental Psychology: Learning, Memory and Cognition* | 2 | 213 | 1% |
| *Journal of Personality and Social Psychology* | 4 | 298 | 1% |
| *Psychology of Addictive Behaviors* | 1 | 93 | 1% |
| *Psychotherapy: Theory, Research, Practice, and Training* | 1 | 76 | 1% |
| Total | 22 | 1401 | 2% |

## WHAT KINDS OF RESEARCH QUESTIONS ARE PSYCHOLOGISTS ASKING IN WEB-BASED RESEARCH?

A wide range of substantive questions is being addressed with Web-based research methods in psychology. As can be seen in Table 2, more articles of this kind appeared on a percentage basis in the *Journal of Applied Psychology* and the *Journal of Counseling Psychology* than in other APA journals. In terms of raw counts, an equal number of papers appeared in the *Journal of Personality and Social Psychology.* That said, our more extensive sample that included submissions from listservs also included articles across a broader array of inquiry, including clinical, cognitive, and sports psychology. Overall, it appears that no one area of psychology has led the charge in turning to the Web for data collection.

We classified studies into one of three types based on their approach to using the Web in research: translational, phenomenological, or novel. Below we define these three types of Web-based psychological research and provide examples of how they are used in psychological research.

### Translational

The largest percentage of studies (59%) in our sample took a translational approach to using the Web in research. Translational research involves adapting materials and methods originally developed for offline use for use on the Internet. For example, Srivastava and colleagues (2003) used the Internet to test nature versus nurture models of personality development. The biological model predicts that personality should become relatively stable by adulthood (i.e., age 20 and over), whereas the contextualist model predicts that people's personality is affected by changes in their life circumstances over time. The latter perspective therefore predicts that one will see considerable variability in personality types across different age cohorts.

Srivastava et al. (2003) translated the typical paper-and-pencil version of the Big Five personality inventory to a Web-based form to test competing predictions from biological and contextualist accounts of personality. In total, 132,515 people who ranged in age from 21 to 60 found and completed the inventory. The results of this cross-sectional study found that there was considerable variability in the distributions of Big Five types across different age cohorts, including those well past the age of 30, results that were better explained by contextualist than by biological theories of personality development. Other personality researchers have adapted a variety of other personality inventories for online studies as well (e.g., Foster et al. 2003; Gosling & Bonnenburg 1998; Robins et al. 2001, 2002; Wei et al. 2004).

Other translational research adapted Milgram's (1977) "lost letter" technique for studying attitudes online by sending presumably "lost" e-mail messages to unwitting study participants (e.g., Castelli et al. 2001; Stern & Faber 1997; Vaes et al. 2003, Study 1). For example, Vaes et al. (2003) explored whether people would be more likely to respond to lost e-mail messages as a function of whether

the sender was an in- or out-group member, and whether the sender's message expressed a primary or secondary emotion. Participants (400 professors at a Belgian university) "erroneously" received an e-mail from the researchers. The first line of the e-mail was an expression of primary (i.e., "I'm beside myself with rage") or secondary (i.e., "I'm filled with indignation") emotion. To manipulate group membership, the message sender was identified either as a researcher at a different university or at the same university as the recipient. In addition to exploring whether the e-mail was forwarded to the intended recipient, the researchers coded the brief explanatory note that generally accompanied the forwarded message. A solidarity index was calculated by subtracting the number of formal from informal pronouns used in the explanatory note (therefore, negative values on this index reflected greater solidarity, and positive numbers reflected greater distance from the presumed original sender of the e-mail message). Although there were no differences as a function of emotion or group membership on overall forwarding rates of the lost e-mails, forwarded messages expressed higher levels of solidarity with the original writer when it came from an in-group member who expressed a secondary emotion.

Skitka & Mullen (2002) studied reactions of a nationally representative Web-enabled sample (see description of Knowledge Networks below) to assess people's reactions to the case of Elián González (a 6-year-old Cuban boy rescued at sea in November 1999 and brought to the United States) as it unfolded over time. Participants were sent e-mail messages with embedded URLs that directed them to the survey Web site at three critical junctures in this case—several weeks prior to the raid in which U.S. government officials took the boy from relatives and reunited him with his father, two days after the raid, and then the day Elián returned to Cuba. They found that people's postresolution judgments of procedural fairness, outcome fairness, and decision acceptance were predicted solely by preraid assessments of the strength of moral conviction that people associated with the value of political freedom or parental rights. The ability to quickly field a study in response to real-world events, and to instantly contact large samples of people to participate in a survey, are each rather unique advantages of Web-based research (see also Skitka et al. 2004 and Silver et al. 2002 for examples of similar Web-based longitudinal panel designs in response to the events of September 11, 2001).

Health and sports psychologists are also turning to the Web to do research. For example, Langenbucher et al. (2004) used the Web to find 500 anabolic steroid users for their research. Links to the survey were placed on five moderated anabolic steroid discussion boards. The survey assessed the steroid users' training regimen, history of steroid use, and several other measures regarding the effects of steroid use. Results indicated that 60% of participants would use drugs that shortened their lives by an average of five years if it enabled them to enhance their physical performance. In addition, despite the risk of side effects, some of which could pose serious health risks, 54% would continue using steroids for the next 10 years and 34% expected to use anabolic steroids for the rest of their lives. In addition to being an example of translational research, the Langenbucher et al. (2005) study

is also an excellent example of how the Web can facilitate access to specialized populations. In addition, the relative anonymity of the Internet probably led to higher response rates to this study than would be likely to be observed with other participant recruitment strategies, given that anabolic steroid use tends to be an intensely solitary practice, hidden even from other users (Langenbucher et al. 2004).

Cognitive researchers have also taken a translational approach to Web-based research. For example, Steyvers & Malmberg (2003) studied context effects on word recognition with both on- and offline samples of college students. Participants were presented with words that systematically varied in their context variability, that is, words that appeared in only one or several different written settings, as well as in their frequency in the English language. Participants then were asked to recall whether they had been exposed to the word in a subsequent word recognition test. Words higher in context variability were recalled less frequently than words low in context variability, regardless of whether participants completed the experiment with traditional paper-and-pencil exposure and test materials or with online exposure and test materials. Other researchers have similarly replicated numerous cognitive effects using online, rather than paper-and-pencil or en vivo presentation of stimulus materials. For example, researchers have examined the interpretation of conditional (if-then) statements (Oberauer & Wilhelm 2003) and the effects of preactivation of content categories on memory (Eichstaedt 2002) using Web-based data collection.

These are but a few examples of areas in which researchers have begun to translate their methods and approaches for use on the Web. Other researchers have successfully adapted their methods to allow them to study these psychological phenomena with online samples and have been able to use this medium to effectively extend research and theorizing in areas of persuasion (e.g., Guadagno & Cialdini 2002; Guégen & Jacob 2001, 2002; Sagarin et al. 2004), implicit attitudes (e.g., Nosek et al. 2002), decoding of nonverbal cues (Hortsman 2003), group dynamics and interaction (Postmes et al. 1999, 2001), relationship formation (McKenna et al. 2002), consumption habits (e.g., Iacobucci 2003), adult attachment (e.g., Wei et al. 2004), job satisfaction (e.g., Judge & Ilies 2004), organizational behavior (e.g., Eaton & Struthers 2002), coping with psychological trauma (Silver et al. 2002), and medical decision making (e.g., Waters et al. 2005).

In sum, increasingly diverse researchers have found that it is both useful and possible to translate traditional measures and methods of psychological research for use on the Web. In fact, the majority of the studies in our sample were straightforward translations of traditional psychological measures and methods for use on the Web. These studies were designed to ask the same kinds of questions and to employ methods that one typically uses in the psychological laboratory. The focus of translational research tends to be less on the Web per se than it is on using the Web as a tool that facilitates ease of reaching participants and ease of data collection. In short, using the Web in translational research is a means to an end, not an interesting end in itself for most of these researchers. Other researchers,

however, have been more interested in the unique psychological experiences that might be associated with Web-based interaction.

## Phenomenological

Phenomenological research was the next largest category of Web-based psychological research in our sample (36%). Unlike translational research that focuses on general psychological processes and can describe both on- and offline behavior, phenomenological studies are focused more on the specific nature of how Internet use and Internet-based interaction influence people's thoughts, feelings, and behavior (Skitka & Sargis 2005). Researchers have noted that there are at least four novel and important aspects of the online environment that in turn could have novel psychological consequences for those who engage in online behavior (McKenna & Bargh 2000). First, the Internet is a more anonymous interaction setting than most other social environments. Usually, one's physical appearance is one of the most salient features of an interpersonal encounter: People infer a great deal about each other based on characteristics such as gender, race, attractiveness, age, and so forth. Online, people can control what others learn about them—one's gender, etc., can be concealed, revealed, or even changed at will. Second, physical distance is no barrier for interacting with others. Third, people have greater control over the time and place of interaction than is typical of other modalities, such as the telephone or in-person encounters. For example, one can choose whether to respond to an e-mail message immediately or several days later. Fourth, Internet communication is for the most part without visual or auditory cues, such as tone of voice or body posture. Each of these four features of Internet communication in isolation or in combination can lead to online interaction and behavior different from that observed in communication modalities that do not share these relatively unique combinations of features.

McKenna and colleagues' program of research is designed to explore the capacity of the Web to allow people to try out new or less well-accepted aspects of their identities (McKenna & Bargh 1998, 2000; see also Bargh & McKenna 2004 for a review). Interaction on the Web provides a nonthreatening forum for people to explore aspects of themselves that others in their social circle might find unacceptable or offensive. People can and do use the Internet as a relatively safe way to connect with like-minded others and to explore aspects of themselves that they otherwise might have difficulty expressing in their everyday lives. To study the consequences of exploring alternative identities on the Web, McKenna & Bargh (1998) contacted samples of people who frequently posted comments on forums for those with stigmatized sexual identities (e.g., alt.homosexual, alt.bondage; Study 2) or political ideologies (e.g., alt.skinheads, misc.activism.militia, Study 3). These researchers also made a special effort to recruit lurkers to participate by posting invitations for participation in the study on these same forums. The researchers found support for the notion that participation in these online communities had important psychological and interpersonal consequences for those

involved. Specifically, people who explored alternative identities in Web-based communities perceived their marginal identity as increasingly important, and this sense of importance led to higher levels of self-acceptance and to disclosing the marginalized identity to friends and family.

Other research has focused on the Web phenomena of blogging, that is, interactive Web pages that are frequently (often daily) updated by their authors. Blog content can vary from being focused on a single topic, such as cooking or politics, or can be an online journal with the author's observations on whatever comes to mind. Readers are often encouraged to post responses or reactions to blogs.

For example, Blanchard (2004) studied the sense of community among those who participated in or followed the Julie/Julia blog. Julie, a Web blogger, worked her way through every recipe in Julia Child's *Mastering the Art of French Cooking* book over the course of a year, and documented her progress and reactions to the experience online. The blog received thousands of daily hits, and provided a forum where readers could comment and the author or others could respond. Julie agreed to let Blanchard post a link on the blog that directed readers and participants to a survey Web site that assessed participants' reactions to following this particular blog. Results of the survey indicated that reading blogs does create a modest sense of community, and active participation (e.g., more frequent posting of comments) led to even stronger senses of community with other blog participants.

An excellent example of the phenomenological approach is research conducted by Kraut and colleagues on the relationship between Internet use and psychological well-being (Kraut et al. 1998, 2002; see also Bargh & McKenna 2004 for a broad review of related research). Kraut and colleagues tested two competing hypotheses about how time spent online would affect people's psychological well-being. Specifically, one could argue that because the Web facilitates social involvement with others through e-mail, instant messaging, and so on, the time spent online facilitates social connections, and for that reason, will facilitate psychological well-being. However, it is also easy to make the opposite prediction. As time online increases, it seems reasonable to assume that time available for in-person social interaction will decrease, and will lead to stronger feelings of social isolation and therefore lower levels of well-being.

To test these competing hypotheses, Kraut et al. (1998) tracked the Internet-use habits of 93 households that were provided Internet access as part of the study. Levels of Internet use, based on server logs of hours spent online, e-mail volume, and number of Web sites visited per week, were tracked. Results indicated that as time spent online increased, real-world social involvement decreased. Participants who spent more time online also reported higher levels of loneliness and depression relative to before they first obtained home access to the Web.

Kraut et al. (2002) reported on a follow-up study of the same participants approximately two years later. The results of this study found that the dismal picture that emerged when people first gained access to the Internet had disappeared once they adapted over a longer period to having home access to the Web. Results revealed that there was no effect of hours spent online on reported loneliness, and that

depression was actually lower among heavier than light Web users. These results suggest that even though there may be short-term deleterious consequences with Web use, once people have Web access for a while, increased use is associated with greater social support and higher levels of well-being over time. Related research has explored whether Internet use has similar consequences across different age groups, and has found that although overall time online did not have negative effects on dispositional or daily well-being in a sample of early adolescents, instant messaging activity among close peers was a unique contributor to increased daily social anxiety and loneliness in school (Gross et al. 2002).

Other phenomenological approaches have explored the implications of online sexual role-play and interaction. Some believe that sexual role play and interaction on the Web can facilitate adjustment by providing people with needed validation or sexual education, whereas others are concerned that this kind of online activity has the possibility of interfering with people's offline personal, occupational, and social lives. Cooper et al. (2004) investigated the consequences of online sexual behavior by sending an e-mail invitation to participate in a survey dealing with online sexual behavior to every thousandth visitor to MSNBC's Web site over a one-month period. From an initial pool of 7019 respondents, 403 participants who indicated that their online sexual activities had been a problem for them, and the time they reported spending on online sexual activities seemed out of control, were classified as having online sexual problems. Of these 403 participants, only 19 were women. Consequently, the researchers confined their analyses to the 384 men for whom online use of the Internet for sexual activities appeared to be problematic. The majority of this subsample reported that they engaged in online sexual behavior to alleviate stress; moreover, most reported that they received complaints from their real-life sexual partners about their online activities. Men who turned to sexual role play and behavior online for other reasons, such as sexual education, meeting partners for offline sex, or simply to socialize, were less likely to receive complaints and were more likely to report enhanced sex lives with their partners as a consequence of their online activities than were men motivated by alleviating stress.

The above is a small sample of phenomenological psychological research conducted on the Internet. Other examples of phenomenological research on the Web include studies of cyber-ostracism (i.e., social ostracism in online situations; see, e.g., Williams et al. 2000, 2002), effectiveness of online therapies (e.g., Lange et al. 2003, Ritterband et al. 2003, Strom et al. 2004), e-mail messages as a tool for improving smoking cessation interventions (e.g., Lenert et al. 2004), and the effectiveness of emotional support in online breast cancer support groups (e.g., Lieberman et al. 2004).

## Novel

Finally, a small but distinctive portion of the studies we reviewed was best categorized as novel methodological use of the Internet (5%), rather than translational or

phenomenological methodological approaches. These studies used methods that to our knowledge did not mirror those typically used in non-Internet based research, that were not focused on studying how people used the Internet or the consequences of their Internet use, and that stood out for their comparative creativity in their approach. These studies are worth bringing into a separate spotlight to illustrate the truly new and innovative ways that one can use the Internet to facilitate psychological inquiry.

For example, Rentfrow & Gosling (2003, Study 4) made creative use of information freely available on the Internet to test hypotheses on the psychology of music preferences. They accessed a random sample of 500 individuals' online music libraries (selecting 10 from each state in the United States) on Web sites that were designed for sharing and downloading of music (e.g., Audiogalaxy.com, Morpheus.com, Napster.com). Music preferences were classified as a function of music genre. Of interest was whether the underlying pattern of dimensionality in music preferences revealed in these libraries paralleled those found when people were asked to report directly their music preferences (Rentfrow & Gosling 2003, Study 2). Results revealed considerable convergence across these very different methods of testing dimensionality of music preferences.

Another study tested a model of social perception by studying the accuracy of personality inferences people derived from personal Web sites (Vazire & Gosling 2004). The researchers sent e-mail messages to people who had posted personal Web pages listed in a Yahoo! directory and asked them to (*a*) complete an online personality inventory (a version of the Big Five personality inventory), and (*b*) supply the name and e-mail address of at least two people who knew them. Experimenters contacted these people and asked them to complete an online personality inventory about the Web page author. Of the 385 Web site authors contacted, 89 completed the consent form for the study and 79 completed the online survey about themselves. The experimenters received two informant responses for 70 of the page authors and at least one informant survey for 81 of the authors.

Self- and close-other ratings were compared with ratings made by third-party judges whose only information about the targets was their personal Web page. Results indicated that there was high convergence of ratings across judges, and that judges were most accurate in predicting openness, followed by conscientiousness, extraversion, and emotional stability. Although significant, judges' predictions of agreeableness were weaker than their predictions for other facets of personality on the Big Five based on knowledge of only targets' Web pages.

Other examples of novel use of the Web in psychological research include a study that staged an online auction to examine ethnic discrimination on a German online auction site. This study involved planting sellers of similar products and varying the ethnicity of their surnames. Sellers with Turkish names (a minority group in Germany) took longer to receive winning bids than did those with German names (Shobat & Musch 2003). Another novel approach involved posting different "problems" on hate-group discussion boards to examine factors that lead to advocating violence against racial minorities (Glaser et al. 2002). Other research

has examined rumor transition in a naturalistic setting by studying posts in reaction to a rumor on an electronic bulletin board (Bordia & Rosnow 1998).

## METHODOLOGICAL CHARACTERISTICS OF WEB-BASED PSYCHOLOGICAL RESEARCH

In addition to exploring the kinds of questions being investigated in Web-based psychological research, we coded the studies in our sample for whether researchers took correlational, experimental, qualitative, or descriptive approaches in their Web-based research, the kinds of sampling techniques they used, and whether they used informed consent, debriefed participants, and involved deception. A summary of the sample characteristics on these dimensions is presented in Table 3.



**TABLE 3** Methodological characteristics of Web-based research in psychological research (using combined American Psychological Association journal and listserv samples)

| Method | Percentage |
|---|---|
| Correlational | 39% |
| Experimental | 54% |
| Qualitative | 4% |
| Descriptive | 3% |
| Sample characteristics[a] | |
| College students | 25% |
| Targeted sample | 36% |
| Self-selected sample | 35% |
| Random sample | 1% |
| Not reported | 1% |
| Informed consent process | |
| Clearly obtained | 62.5% |
| Not obtained | 12.5% |
| Unclear | 25% |
| Debriefing | |
| Participants clearly debriefed | 41% |
| Participants not debriefed | 14% |
| Unclear | 45% |
| Deception | |
| Yes | 18% |
| No | 82% |

[a]Two of the reported studies recruited participants both via the Internet and from college student samples.

## Methods

As can be seen in Table 3, the majority of studies in our sample reported on experimental research, that is, research that explicitly involved experimental manipulation of a variable or variables (54%). Many of these studies took advantage of HTML code that makes it easy to assign participants randomly to different forms when they access a Web site. Thirty-nine percent of the studies in our sample took correlational approaches and the remaining 7% were either qualitative or descriptive in approach.

## Samples

We were also interested in exploring the kinds of samples researchers were attempting to obtain in Web-based research. Clearly, one of the major advantages of turning to the Web to obtain research participants is the ability to either gain access to more representative samples than one typically finds in college student subject pools or to be able to identify participants from specialized populations that are likely to be of low incidence in either the college subject pool or in the population at large. That said, a surprisingly high number of the studies in our sample appeared to be motivated to use the Web and Web-based forms in their research for other reasons, because 25% of them used the Web to collect data from college student samples. Thirty-six targeted specific groups of participants (e.g., random selections of music libraries or Web pages on Yahoo!). Thirty-five percent used what we called "opt-in" samples, that is, samples of people who find the study themselves because they are searching the Web using terms such as "personality tests."

One percent of our sample of studies used true random samples of participants (a total of 9 studies). Studies that took this approach subcontracted their research to be conducted by a company that has created a nationally representative panel of Web-enabled households, about 50% of whom did not have prior home access to the Internet before joining the survey panel (Knowledge Networks; see http://www.knowledgenetworks.com/ganp for more details).[1] A final 1% (9 studies) did not provide information about how they obtained their participants.

[1]Knowledge Networks recruits households to join their panel by using random-digit-dialing telephone solicitation, which ensures that there is an equal probability of households with a phone being contacted and invited to participate on the panel. Prospective panelists are offered a free device to connect to the Web and paid Internet access if they join the panel. In exchange, household members above the age of 13 are asked to complete occasional Web surveys. Panelists receive password-protected e-mail accounts, and receive e-mail messages with embedded links to surveys about three times a month. Panel characteristics closely match those of the United States census. A number of other companies also offer access to Web-based panels of people who have agreed to complete surveys, and can offer quota samples that are matched to census characteristics, or sample data weighted by propensity scores to better match census proportions of different demographic groups in the population. However, members of these panels do not include people without prior independent access to the Web. None of the studies in our sample used these alternative sources of data.

## Informed Consent

Norms about how to conduct ethical research on the Web are still emerging, including whether it is necessary to collect informed consent to use materials posted on Web sites (e.g., King 1996, Eysenbach & Till 2001). Therefore, it was interesting to explore the degree to which psychological researchers are reporting whether they have obtained informed consent in Web-based research. As can be seen in Table 3, the majority of studies we reviewed explicitly mentioned that they obtained informed consent from their research participants (62.5%). No mention of whether informed consent was obtained was mentioned in 25% of the studies we reviewed, and it was clear that informed consent was not obtained in 12.5% of the studies we reviewed.

## Debriefing

We also coded studies in our review for whether they debriefed their research participants. Forty-one percent of the studies we reviewed made explicit mention that research participants were debriefed, 45% were not clear about whether participants were or were not debriefed, and for 14% of the studies, it was clear that participants were not debriefed.

## Deception

Finally, we also coded studies for whether they involved deception. As can be seen in Table 3, 17% of the studies in our sample involved deception of research participants. Of those studies that used deception, fewer than half indicated that they debriefed study participants. Although in some cases the deception seemed to be relatively benign, the seemingly high (to these reviewers' minds) level of deception in Web-based research deserves further discussion.

In summary, the Internet is being used primarily for experimental and correlational research. The samples researchers access vary considerably, with a surprisingly high percentage (25%) of researchers still relying on college students even when they turn to the Web to collect data. Therefore, it appears that at least some psychologists are adapting studies to be conducted on the computer using HTML forms in an effort to save the time and effort of manual data entry, and are not turning to the Web because it provides them access to either broader or more specialized samples. Although the majority of researchers who turn to the Web obtain informed consent from their research participants, not as many appear to be debriefed. Finally, 17% of the studies in our Web sample used deception, and only about half of these appeared to debrief their participants.

We discuss below what we perceived as the strengths of the studies we reviewed, as well as the potential advantages of turning to the Internet for psychological research. We then summarize what we perceive as the weaknesses of the studies we reviewed, as well as the potential disadvantages of Web-based psychological research.

## THE PROMISE AND ADVANTAGES OF CURRENT WEB-BASED RESEARCH IN PSYCHOLOGY

Web-based psychological research seems to have a number of methodological virtues. Relative to other approaches to collecting data for psychological research, the virtues of Internet-based research generally include (*a*) license for greater measurement and methodological creativity, (*b*) increased efficiency, (*c*) increased access to people with special characteristics, and (*d*) potential for increased data quality.



### Creative License

Whenever researchers adopt new technology, there seems to be considerable new license and experimentation in both method and measurement. The sample of studies we reviewed for this chapter often showed remarkable creativity in how researchers operationalized variables and the methods they used to test hypotheses. Sampling online music libraries, studying Web pages, manipulating posts to chat rooms to test for reactions, using graphical displays of people's personality profiles as feedback for completing a personality inventory, and much more were evident in the articles we reviewed. Many of the Web sites that were designed for data collection are also now educational Web sites that teach people about the phenomena researchers are studying (e.g., Nosek et al. 2002). In short, one advantage of turning to the Internet for data collection is that it prompts one to think outside of the traditional box and leads to creative methods and measurement. There also seems to be little research on the Web that asks people to respond to hypothetical scenarios, or to role-play; to a considerable degree, the emphasis is on behavioral indices and measures instead.

### Efficiency

Internet research has a number of features that can save time and money (see Skitka & Sargis 2005). With only a little training, one can easily learn some basic programming skills in HTML and can post an interactive form to allow for data collection on the Web. With some additional investment in learning server-side programming, one can also set it up so that data are stored in spreadsheets, ready for analysis (see Birnbaum 2000, 2001; Fraley 2003). Web-based research also avoids the waste and costs associated with paper measures. Moreover, mail-merge programs potentially allow one to field a survey to thousands of prospective participants with no more than a keystroke; alternatively, one can simply post a form and wait for the participants to arrive without ever having to schedule an experimental session. Participants are not typically run through experiments either one at a time or in small groups; therefore, one also has the advantage that the time required for data collection is often independent of sample size. What might take months in the lab to accomplish can be accomplished in a matter of days or weeks on the Web.

## Access to Underrepresented or Low-Incidence Samples

Another distinct advantage of Web-based research is the relative ease with which one can find members of groups that one might be particularly interested in studying. For example, many psychological disorders or characteristics that researchers would like to study may be of relatively low incidence in the population in general or in available convenience samples in particular. Searching the Web for special interest or support groups can solve the problem of both finding and accessing these kinds of specialized samples. For example, psychologists have long been interested in trying to account for the psychological factors that are likely to lead to actions of violence toward out-groups (see, e.g., Newman & Erber 2002, Staub 1989). Infiltrating real-world hate groups for the purposes of psychological research is likely to be difficult if not dangerous. Moreover, it is difficult to imagine that many college student subject pools would have sufficient numbers of members who are, or who would admit to being, members of hate groups to allow one to identify appropriate numbers of research participants. Even if one could find members of hate groups, one would not expect them to advocate violence in a laboratory session or in a telephone interview, even if it is something they otherwise would do (cf. Evans et al. 2003). Turning to the Web to test hypotheses about the factors that lead people, and especially hate group members, to advocate violence provides a solution to the usual problem of finding appropriate participants as well as the reactivity of placing these people in a situation that they know is being evaluated.

One group of researchers took advantage of the fact that there are now many hate group–sponsored chat rooms, archives, and Web sites on the Internet, and that these groups provided a novel opportunity to try to test hypotheses about factors that lead these groups to promote intergroup violence. The researchers, who posed as newcomers to a white supremacist online group, posted a problem such as "My sister is talking about getting married to a black man," or "I found out this black couple is moving next door to me" (prompts varied as a function of threat and threat type in a 3 X 3 factorial design; Glaser et al. 2002). Results indicated that hate group members were more likely to advocate violence in response to threats to their group identity (e.g., whites) than to material or economic interests.

Other researchers have similarly used the Internet to obtain access to difficult-to-reach and empirically underrepresented populations such as the anabolic steroid users mentioned above (Langenbucher et al. 2004), gays, lesbians, and bisexuals (see, e.g., Mathy et al. 2002), people with hearing loss (Cummings et al. 2002), and pet owners of a wide range of different animals (Gosling & Bonnenburg 1998). Given the huge number of special interest, news, support, and chat groups that have emerged online, any number of heretofore difficult-to-find populations have become more accessible to researchers.

## Data Quality

Recent research indicates that collecting data on the Web avoids some of the data quality problems one sometimes sees when using other collection methods. As also

reviewed in Skitka & Sargis (2005), Web-based surveys are lower in measurement error, survey satisficing, and social desirability bias than are surveys conducted over the phone or via intercom (Chang & Krosnick 2002a,b). Other research reveals that computerized data presentation and measurement yields similarly high-quality data as paper questionnaires or face-to-face interviews, and higher quality data than telephone surveys (Richman et al. 1999).

People might also be more likely to persist rather than abandon participation in studies that involve a lot of if-then branching conducted on the Web than in studies conducted via paper questionnaires, because branching can be programmed to occur entirely outside of the awareness of research participants. Moreover, participants are generally volunteers, so data quality may be improved because their motivation and involvement may be higher than that of college students who participate not out of any real interest, but to fulfill course requirements or to earn pocket change. Finally, people might also respond more naturally when they serve as research participants in familiar contexts (e.g., their homes) than in the unfamiliar context of a psychology laboratory.



## POTENTIAL LIMITATIONS OR CAUTIONS ASSOCIATED WITH CURRENT WEB-BASED RESEARCH IN PSYCHOLOGY

Although using the Internet for research has a number of potential advantages, our review revealed that it also has a number of limitations (see also Birnbaum 2004, Skitka & Sargis 2005). Potential limitations of current Web-based psychological research include that (*a*) Web users differ from nonusers in a number of ways that may be important, (*b*) response rates to Internet surveys tend to be low, and therefore nonresponse error is quite high, (*c*) a number of technical limitations preclude what kind of research is likely to be suitable for the Web, (*d*) the high anonymity and low accountability of the Web relative to other methods of data collection may introduce a number of problems in some research contexts, (*e*) increased error may occur because of uncontrolled features of participants' context, and finally, (*f*) the potential exists for experimenter deception to "poison the pond" for future psychological research.

### Nonrepresentative Samples

One potential limitation of Internet data collection, at least for researchers who take either a novel or translational rather than phenomenological approach to using the Web for research, is sample representativeness (Skitka & Sargis 2005). Although Internet samples would seem to represent a leap forward over the heavy reliance of psychologists on college student samples, psychologists may be simply replacing one flawed sampling approach with another when they turn to convenience samples of Web users. People who use the Internet are not representative of the general

population, nor are online special interest groups representative of their specific groups (e.g., disabled people who are online differ in important ways from disabled people who are not online; Lenhart et al. 2003).

Based on national representative telephone surveys that explored differences between Web users and nonusers, Web users are younger, wealthier, and higher in education than are nonusers (Lenhart et al. 2003). In comparison with nonusers, Web users are also higher in trust of others, have broader social networks, and generally believe that people are more fair (Lenhart et al. 2003). Opt-in samples of Web users are also more politically knowledgeable and engaged than are random samples of the population (Chang & Krosnick 2002a,b). Although some differences between Web users and nonusers disappear when disparities in education, income, and age are controlled, other differences persist (e.g., Flemming & Sonner 1999, Taylor 2000). Taken together, these results suggest that a number of important differences exist between people who have Web access versus those who do not, and that these differences limit the generalizability of results obtained from convenience samples of Web users.

One could easily argue that the problem of noncoverage is likely to be one that will eventually take care of itself. However, it is not at all clear that penetration of Internet use is likely to continue to increase. Considerable evidence indicates that the rate of newcomers to the Web has flattened out (Lenhart et al. 2003). In addition, there is some evidence that there are high numbers of people who never intend to have online access in the home, and potentially more problematic, there are large numbers of Internet dropouts, persons who have had home access to the Internet but for a variety of reasons have abandoned it (Lenhart et al. 2003). The tendency to opt out of Internet participation is one that is entirely inconsistent with the patterns of adoption observed with other forms of information or communication technology, such as radio, telephone, or television. In short, noncoverage error contributes to sampling bias unless one uses strategies to include non-Web users in one's sample.



## Nonresponse

Noncoverage error refers to the sampling error introduced because not everyone has access to the Web; nonresponse error refers to the fact that not everyone recruited to participate in a given study will choose to do so. Nonresponse can be difficult to calculate for Web studies that post an open invitation for participation because the number of people who could potentially participate but choose not to is unknown. Estimates of response rates of Web users to e-mail solicitation is about 10%, and response rates to specifically targeted banner ads are between 20% and 25%, not anywhere near acceptable response-rate levels to allow for generalization, according to survey research standards (see Couper 2000 for a review). In short, response rates appear to be quite low if the recruitment strategy is either by e-mail or by posting invitations on the Web.

Recent research into the effects of nonresponse error on data quality, however, has found that there is little evidence that recent higher levels of nonresponse

in telephone surveys or exit polls has a major effect on the validity of research findings. For example, one study (Keeter et al. 2000) did a side-by-side comparison of telephone surveys that used identical methods with the exception of whether they took extra steps to garner higher response rates (e.g., whether the researchers used call-backs and other attempts to convert nonrespondents into respondents). The survey that made no particular effort to convert nonrespondents had a response rate of 36%, whereas the more rigorous survey had a response rate of almost 61%. Although there were modest differences in the demographic makeup of the samples obtained, the substantive conclusions were essentially identical across the two surveys (Keeter et al. 2000; see also Curtin et al. 2000, Merkle & Edelman 2002 for similar conclusions). However, none of the existing comparisons have explored whether surveys with nonresponse rates of 80% to 90% or more—common in Web-based research—yield conclusions similar to those with better response rates. Therefore, nonresponse bias remains a potentially serious concern for studies that use Web sampling strategies including e-mail solicitations and banner ads, or that simply wait for people to opt in to their studies.



## Technical Constraints

Although the Internet affords greater flexibility in presentation of stimuli than, for example, paper questionnaires or telephone surveys, there nonetheless are a number of limitations. One cannot deliver via the Web stimuli that can be touched, tasted, or smelled (see also Birnbaum 2004). Similarly, one cannot send or receive audio or visual responses from research participants without investing in special equipment.

There are also potential concerns about both precision and control as one turns to the Web for research. People's ability to load Web pages, and how quickly they are able to do so, vary dramatically as a function of (*a*) whether they access the Internet via modem, cable, or a wireless connection; (*b*) the browser they use; (*c*) features of the device used to connect to the Web (e.g., RAM, processor speed); and (*d*) monitor refresh rates. That said, previously established laboratory effects, and in particular effects related to cognitive or visual processing, generally replicate on the Web. For example, McGraw & Wong (1992) replicated the lab finding of a right-visual-field advantage on the Web in a sample of college students. Other researchers have also had very good success in replicating a number of cognitive effects, such as Stroop task interference (Krantz & Dalal 2000, McGraw et al. 2000, Musch & Reips 2000). However, because monitor refresh rates are often slower or similar in speed to the response latencies researchers are trying to detect, the Internet may not be optimal for research that is dependent on detecting reactions to small differences in exposure or small differences in response time.

## Context

In addition to error variance introduced through software and hardware variation across respondents, the experimental context is also free to vary in most Internet research, whereas it is kept more constant in laboratory studies. Some people

may participate in a given Web study in the presence of others, whereas others will participate while alone; some participants may be highly distracted by other features of the environment that compete for their attention, whereas others will have little in the way of distraction, and so on. How big of a problem this might be probably depends on the phenomena being studied.

## Anonymity

A related issue is that social interaction and communication on the Web are often highly if not completely anonymous: People can and do take on alternative identities and can take a number of steps to protect their real identities. People can and do set up multiple e-mail accounts, and researchers have little ability to check the veracity of any given identity. For example, Mathy et al.'s (2002) attempt to study lesbian online behavior was hampered to some degree because it is not unusual for males to pose as lesbians in chat rooms for gay and bisexual women. Although phenomenological researchers are likely to see this kind of posing as an interesting feature of Web-based communication and one worthy of study, the tendency to take on false identities on the Web poses a problem for those whose research depends on successfully identifying specific personal characteristics of research participants.

In addition to possible concerns about research participants who are "posers" of one kind or another, there are other reasons to be concerned about the anonymous nature of the Web. Higher levels of anonymity are well known to be associated with lower levels of self-awareness and individuality (i.e., deindividuation) that in turn can lead to reduced self-regulation and subsequent antisocial behavior (e.g., Deiner 1980, Zimbardo 1970). Perhaps not surprisingly, researchers have found that people are more likely to respond with hostile and aggressive responses in computer-mediated than in face-to-face interactions (Culnan & Markus 1987, Dubrovsky et al. 1991, Kiesler et al. 1984, Siegal et al. 1986, Williams et al. 2002).

In addition, the social identity model of deindividuation (Spears & Lea 1994) predicts that people conform more to group expectations in more deindividuated as compared to more individuated contexts. Therefore, one might expect people to be more likely to conform to group norms in Internet-based communication than in face-to-face interaction settings. Recent research has supported this hypothesis: People show more attitude change in the direction of a group norm in computer-mediated than in non-computer-mediated communications (Sassenberg & Boos 2003).

Increased anonymity is also associated with lower levels of accountability (see Lerner & Tetlock 1999 for a review) that in turn have a number of implications for how people think and behave online. Considerable research has found that people exhibit more bias when they are low rather than high in social accountability for their judgments, decisions, or behaviors. Low levels of accountability are associated with stronger primacy effects in impression formation (Tetlock 1983), an increased tendency to make the fundamental attribution error (Tetlock 1985),

and stronger overconfidence effects (Tetlock & Kim 1987), as well as greater persistence due to "sunk costs" (Simonson & Nye 1992). The high anonymity and low accountability of Web-based communication distinguishes it from other communication modalities, a difference that may limit its generalizability.

## Ethical Constraints

It seems that most Institutional Review Boards are concluding that online postings represent the public domain and that researchers do not need to obtain informed consent to use this material. There nonetheless is some debate about whether researchers should get informed consent before using Web postings for research (see Frankel & Siang 1999 for a review). Although the public domain argument is a persuasive one to researchers, the public nonetheless may see exploiting online material for research purposes as a violation of their privacy. Consistent with this idea, a number of researchers have discovered that chat room and discussion-group members felt that an implicit social contract had been violated when they discovered that researchers had observed their behavior without their consent (e.g., Finn & Lavitt 1994, King 1996). However, even when researchers do attempt to obtain informed consent, the anonymity of Internet communication can make it difficult to implement the informed consent process. Researchers cannot verify age and mental competency, and the lack of direct contact between researchers and participants makes it difficult for researchers to assess participants' comprehension of risks that may be involved in a given project.

The use of deception in psychological research on the Web is especially problematic, as mentioned above. Deception is considered by many to be ethical if the risks to participants are small, if the hypothesis cannot be tested in nondeceptive ways, and if participants can be effectively debriefed (Smith & Richardson 1983). Debriefing, however, is a difficult thing to accomplish online. With one mouse click, people can close their participation in a chat room, never to return, or similarly may leave an online experiment before reaching the debriefing. Even if participants make it to an online debriefing, or if the researchers e-mail a debriefing to them later, there is no way to be sure that the debriefing has been read (Azar 2000).

Moreover, there has been considerable concern that deception may spoil the pond in research conducted with college student subject pools, specifically, that deceptive research practices may lead students to become more distrustful and change their behavior and attitudes about research (Kelman 1967). The potential risk of deceptive research practices spoiling the online pond and creating widespread public distrust of psychological research and those who do it seems to be even more significant in potential scale and impact than potentially spoiling the pool of college student subjects. At a minimum, researchers have a responsibility to consider the potential vulnerability of the populations they study online, the level of intrusiveness of their research, how best to protect the confidentiality of those they study, and whether public awareness of a given deception has the potential to harm the public's perception of the scientific integrity of the field (Skitka & Sargis 2005).

## CONCLUSIONS

Psychologists have already found many useful ways to employ the Internet to facilitate research, and studies that have used the Internet have begun to appear in the field's major journals. Many lab-based methods can be easily translated for use on the Web, and the Internet provides opportunities for considerable methodological creativity and novelty. Moreover, because the Internet is a relatively unique forum for interpersonal behavior, it is becoming the focus of psychological study in and of itself.

Our review suggests that the Internet has some potential major methodological benefits for psychological research, for example, ease in reaching either large or more specialized samples for research than one can typically find in the college student subject pool. However, our review also reveals that there are reasons to be concerned about the responsible use and interpretation of Internet-based research. For example, 17% of the studies we reviewed involved deception of people on the Internet; of these studies, slightly fewer than half reported that they fully debriefed their participants. The ethicality of using deceptive research practices in Web-based research seems to us to be especially problematic. Deceptive research practices have the potential to undermine public trust in psychological research and those who conduct it, in addition to undermining some of the benefits of the Web for those who use it as a safe way to seek out social support and connections with others.

One of the major benefits of turning to the Web for research also reveals one of its major limitations. Although Web-based samples are no doubt more diverse and representative than are college student subject pools of the populations psychologists want to study, not everyone has access to the Web, and there is some evidence that those who do have access are different in a number of important ways from those who do not. Turning to the Web for data collection therefore brings into focus the need for psychologists to think more seriously about sampling and related methodological concerns. Although cost has traditionally been a major barrier to working with more representative samples, it is not an insurmountable one. One can fund research with more representative samples with grants from private or public agencies. In addition, a recent program has emerged to provide researchers with greater access to representative samples without having to apply for an independent grant. The National Science Foundation has funded the Time-sharing Experiments for the Social Sciences program (see http://www.experimentcentral.org/tess for more information), through which researchers may apply for free access to conduct experiments with Knowledge Networks' nationally representative panel or with a nationally representative telephone sample. Although breaking free of the college student subject pool by turning to convenience samples of Web users is one step toward doing research that is more likely to generalize to the populations we wish to understand, it is an imperfect one. Psychological researchers could take further steps and aim to do more research with truly representative samples.

In summary, the Internet provides considerable opportunities to expand the ways that we conduct psychological research. As information and communication

technologies continue to advance, so too will the opportunities for collecting data in new and novel ways. Our challenge will be to use each of these advances in ways that also improve the rigor and quality of psychological research.

## ACKNOWLEDGMENTS

The authors thank Christopher Bauman and William McCready for reading and providing comments on earlier versions of this chapter, and Jennifer Meyer, Monica Pinedas, Jennifer Thompson, and Ashley Webb for their assistance in identifying articles that used Web-based data collection published in APA journals during 2003–2004 and for their assistance coding the study characteristics of the articles included in this review.

**The *Annual Review of Psychology* is online at http://psych.annualreviews.org**



## LITERATURE CITED

Azar B. 2000. Online experiments: ethically fair or foul? *Monogr. Psychol.* 31:42–47

Bargh JA, McKenna KYA. 2004. The Internet and social life. *Annu. Rev. Psychol.* 55:573–90

Birnbaum MH. 2000. Surveywiz and Factorwiz: JavaScript Web pages that make HTML forms for research on the Internet. *Behav. Res. Methods Instrum. Comput.* 32:339–46

Birnbaum MH. 2001. *Introduction to Behavioral Research on the Internet*. Upper Saddle River, NJ: Prentice Hall

Birnbaum MH. 2004. Human research and data collection via the Internet. *Annu. Rev. Psychol.* 55:803–32

Blanchard AL. 2004. Virtual behavior settings: an application of behavior settings theories to virtual communities. *J. Comput-Mediat. Comm.* 9(2). http://jcmc.indiana.edu/vol9/issue2/blanchard.html

Bordia P, Rosnow RL. 1998. Rumor rest stops on the information highway: a naturalistic study of transmission patterns in a computer-mediated rumor chain. *Hum. Commun. Res.* 25:163–79

Castelli L, Zogmaister C, Arcuir L. 2001. Exemplar activation and interpersonal behavior. *Curr. Res. Psychol.* 6:33–44

Chang L, Krosnick JA. 2002a. *Comparing self-administered computer surveys and auditory interviews: an experiment.* Paper presented at Am. Assoc. Public Opinion Res. Annu. Meet., St. Petersburg, FL

Chang L, Krosnick JA. 2002b. *RDD telephone vs. Internet survey methodology for studying American presidential elections: comparing sample representativeness and response quality*. Paper presented at Am. Polit. Sci. Assoc. Annu. Meet., Boston, MA

Cooper A, Galbreath N, Becker MA. 2004. Sex on the Internet: furthering our understanding of men with online sexual problems. *Psychol. Addict. Behav.* 18:223–30

Couper MP. 2000. Web surveys: a review of issues and approaches. *Public Opin. Q.* 64:464–94

Culnan MJ, Markus ML. 1987. Information technologies. In *Handbook of Organizational Communication*, ed. F Jablin, LL Putnam, K Roberts, L Porter, pp. 420–43. Newbury Park, CA: Sage

Cummings JN, Sproull L, Kiesler SB. 2002. Beyond hearing: where real-world and online support meet. *Group Dyn.* 6:78–88

Curtin R, Presser S, Singer E. 2000. The effects of response rate changes on the index of consumer sentiment. *Public Opin. Q.* 64:413–28

Deiner E. 1980. De-individuation: the absence of self-awareness and self-regulation in group members. In *The Psychology of Group*

*Influence*, ed. P Paulus, pp. 1160–71. Hillsdale, NJ: Erlbaum

Dubrovsky VJ, Kielser SB, Sethna BN. 1991. The equalization phenomenon: status effects in computer-mediated and face-to-face decision-making groups. *Hum.-Comput. Interact.* 6:119–46

Eaton J, Struthers CW. 2002. Using the Internet for organizational research: a study of cynicism in the workplace. *CyberPsychol. Behav.* 5:305–13

Eichstaedt J. 2002. Measuring differences in preactivation on the Internet: the content category superiority effect. *J. Exp. Psychol.* 49: 283–91

Evans DC, Garcia DJ, Garcia DM, Baron RS. 2003. In the privacy of their own homes: using the Internet to assess racial bias. *Personal. Soc. Psychol. Bull.* 29:273–84

Eysenbach G, Till E. 2001. Ethical issues in qualitative research on Internet communities. *Br. Med. J.* 323:1103–5

Finn J, Lavitt M. 1994. Computer-based self-help groups for sexual abuse survivors. *Soc. Work Groups* 17:21–46

Flemming G, Sonner M. 1999. *Can Internet polling work? Strategies for conducting public opinion surveys on-line*. Presented at Annu. Meet. Am. Assoc. Public Opin. Res., St. Petersburg Beach, FL

Foster JD, Campbell W, Twenge JM. 2003. Individual differences in narcissism: inflated self-views across the lifespan and around the world. *J. Res. Personal.* 37:469–86

Fraley RC. 2003. *How to Conduct Psychological Research over the Internet: A Beginner's Guide to HTML and CGI/Perl*. New York: Guilford

Frankel MS, Siang S. 1999. *Ethical and legal aspects of human subjects research on the Internet: a report of a workshop June 10–11, 1999*. http://www.aaas.org/spp/dspp/sfrl/projects/intres/report.pdf

Glaser J, Dixit J, Green DP. 2002. Studying hate crime with the Internet: What makes racists advocate racial violence? *J. Soc. Issues* 58:177–93

Gosling SD, Bonnenburg AV. 1998. An integrative approach to personality research in anthrozoology: ratings of six species of pets and their owners. *Anthrozoös* 11:148–56

Gross EF, Juvonen J, Gable SL. 2002. Internet use and well-being in adolescence. *J. Soc. Issues* 58:75–90

Guadagno RE, Cialdini RB. 2002. Online persuasion: an examination of gender differences in computer-mediated interpersonal influence. *Group Dyn.* 6:38–51

Guégen N, Jacob C. 2001. Fund-raising on the Web: the effect of an electronic foot-in-the-door on donation. *CyberPyschol. Behav.* 4:705–9

Guégen N, Jacob C. 2002. Social presence reinforcement and computer-mediated communication: the effect of the solicitor's photography on compliance to a survey request made by e-mail. *CyberPsychol. Behav.* 5: 139–42

Hortsman G. 2003. What do facial expressions convey: feeling states, behavioral intentions, or action requests? *Emotion* 3:150–66

Iacobucci D, ed. 2003. Consumers in cyberspace [special issue]. *J. Consum. Psychol.* 13:Entire issue

Judge TA, Ilies R. 2004. Affect and job satisfaction: a study of their relationship at work and at home. *J. Appl. Psychol.* 89:661–73

Keeter S, Miller C, Kohut A, Groves RM, Presser S. 2000. Consequences of reducing nonresponse in a national telephone survey. *Public Opin. Q.* 64:125–48

Kelman HC. 1967. Human use of human subjects: the problem of deception in social psychological experiments. *Psychol. Bull.* 67:1–10

Kiesler S, Siegal J, McGuire T. 1984. Social psychological aspects of computer-mediated communication. *Am. Psychol.* 39:1123–34

King SA. 1996. Researching Internet communities: proposed ethical guidelines for the reporting of results. *Inform. Soc.* 12:119–27

Krantz JH, Dalal R. 2000. Validity of Web-based psychological research. In *Psychological Experiments on the Internet*, ed. NM Birnbaum, pp. 35–60. Orlando, FL: Academic

Kraut R, Kiesler S, Boneva B, Cummings J, Helgeson V, Crawford A. 2002. The Internet paradox revisited. *J. Soc. Issues* 58:49–74

Kraut R, Patterson M, Lundmark V, Kiesler S, Mukopadhyay T, Scherlis W. 1998. Internet paradox: a social technology that reduces social involvement and psychological well-being? *Am. Psychol.* 53:1017–31

Lange A, Rietdijk D, Hudcovicova M, van de Ven JP, Schrieken B, Emmelkamp PMG. 2003. Intertherapy: a controlled randomized trial of the standardized treatment of post-traumatic stress through the Internet. *J. Consult. Clin. Psychol.* 71:901–9

Langenbucher J, Hildebrandt T, Carr S, Sanjuan P, Roth S, Parker S. 2004. *Patterns of anabolic steroid use among 500 male weightlifters*. Paper presented at Conf. Coll. Probl. Drug Depend., San Juan, Puerto Rico

Lenert L, Munoz RF, Perez JE, Bansod A. 2004. Automated e-mail messaging as a tool for improving quit rates in an Internet smoking cessation intervention. *J. Am. Med. Inform. Assoc.* 11:16–20

Lenhart A, Horrigan J, Rainie L, Allen K, Boyce A, et al. 2003. *The Ever-Shifting Internet Population: A New Look at Internet Access and the Digital Divide*. Washington, DC: Pew Internet Am. Life Proj.

Lerner JS, Tetlock PE. 1999. Accounting for the effects of accountability. *Psychol. Bull.* 125:255–75

Lieberman MA, Golant M, Winzelberg A, McTavish F, Gustafson DH. 2004. Comparisons: professionally directed and self-directed Internet groups for women with breast cancer. *Int. J. Self-Help Self-Care* 2:219–35

Mathy RM, Schillace M, Coleman SM, Berquist BE. 2002. Methodological rigor with Internet samples: new ways to reach underrepresented populations. *Cyberpsychol. Behav.* 5:253–66

McGraw KO, Tew MD, Williams JE. 2000. The integrity of Web-delivered experiments: Can you trust the data? *Psychol. Sci.* 11:502–6

McGraw KO, Wong SP. 1992. A common language effect size statistic. *Psychol. Bull.* 111:361–65

McKenna KYA, Bargh JA. 1998. Coming out in the age of the Internet: identity "demarginalization" through virtual group participation. *J. Personal. Soc. Psychol.* 75:681–94

McKenna KYA, Bargh JA. 2000. Plan 9 from cyberspace: the implications of the Internet for personality and social psychology. *Personal. Soc. Psychol. Rev.* 4(1):57–75

McKenna KYA, Green AS, Glason MEJ. 2002. Relationship formation and the Internet: What's the big attraction? *J. Soc. Issues* 58:9–32

Merkle D, Edelman M. 2002. Non-response in exit polls: a comprehensive analysis. In *Survey Non-response*, eds. RM Groves, DA Dillman, JL Eltinge, RJA Little, pp. 243–58. New York: Wiley

Milgram S. 1977. *The Individual in the Social World*. New York: McGraw Hill

Musch J, Reips U. 2000. A brief history of Web experimenting. In *Psychological Experiments on the Internet*, ed. M Birnbaum, pp. 61–87. Orlando, FL: Academic

Newman L, Erber R. 2002. *Understanding Genocide: The Social Psychology of the Holocaust*. New York: Oxford Univ. Press

Nosek BA, Banaji MR, Greenwald AG. 2002. Harvesting implicit group attitudes and beliefs from a demonstration Website. *Group Dyn.* 6:101–15

Oberauer K, Wilhelm O. 2003. The meaning(s) of conditionals: conditional probabilities, mental models, and personal utilities. *J. Exp. Psychol. Learn.* 29:680–93

Postmes T, Spears R, Lea M. 1999. Social identity, normative content, and "deindividuation" in computer-mediated groups. In *Social Identity: Context, Commitment, and Content*, ed. N Ellmers, R Spears, D Doosje, pp. 164–83. Oxford: Blackwell

Postmes T, Spears R, Sakhel K, de Groot D. 2001. Social influence in computer-mediated communication: the effects of anonymity on group behavior. *Personal. Soc. Psychol. Bull.* 27:1243–54

Rentfrow PJ, Gosling SD. 2003. The do re

mi's of everyday life: examining the structure and personality correlates of music preferences. *J. Personal. Soc. Psychol.* 84:1236–56

Richman W, Kiesler S, Weisband S, Drasgow F. 1999. A meta-analytic study of social desirability distortion in computer-administered questionnaires, traditional questionnaires, and interviews. *J. Appl. Psychol.* 84:754–75

Ritterband LM, Cox DJ, Walker LS, Kovatchev B, McKnight L, Patel K. 2003. An Internet intervention as adjunctive therapy for pediatric encopresis. *J. Consult. Clin. Psychol.* 71: 910–17

Robins RW, Tracy JL, Trzesniewski KH, Potter J, Gosling SD. 2001. Personality correlates of self-esteem. *J. Res. Personal.* 35:463–82

Robins RW, Trzesniewski KH, Tracy JL, Gosling SD, Potter J. 2002. Global self-esteem across the lifespan. *Psychol. Aging* 17:423–34

Sagarin BJ, Britt MA, Heider J, Wood SE, Lynch J. 2004. *The distraction and persuasion effects of on-line advertisements*. Presented at Midwest. Psychol. Assoc. Annu. Meet., Chicago, IL

Sassenberg K, Boos M. 2003. Attitude change in computer-mediated communication: effects of anonymity and category norms. *Group Process. Intergroup Relat.* 6:405–22

Sears DO. 1986. College sophomores in the lab: influences of a narrow data base on social psychology's view of human nature. *J. Personal. Soc. Psychol.* 51:515–30

Shobat M, Musch J. 2003. Online auctions as a research tool: a field experiment on ethnic discrimination. *Swiss J. Soc. Psychol.* 62: 139–45

Siegal J, Dubrovsky V, Kiesler S, McGuire TW. 1986. Group processes in computer-mediated communication. *Organ. Behav. Hum. Dec.* 37:157–87

Silver RC, Holman EA, McIntosh DN, Poulin M, Gil-Rivas V. 2002. Nationwide longitudinal study of psychological responses to September 11. *J. Am. Med. Assoc.* 288:1235–44

Simonson I, Nye P. 1992. The effect of accountability on susceptibility to decision errors. *Organ. Behav. Hum. Dec.* 51:416–46

Skitka LJ, Bauman CW, Mullen E. 2004. Political tolerance and coming to psychological closure following September 11, 2001: a model comparison approach. *Personal. Soc. Psychol. Bull.* 30:743–56

Skitka LJ, Mullen E. 2002. Understanding judgments of fairness in a real-world political context: a test of the value protection model of justice reasoning. *Personal. Soc. Psychol. Bull.* 28:1419–29

Skitka LJ, Sargis EG. 2005. Social psychological research and the Internet: the promise and peril of a new methodological frontier. In *The Social Net: The Social Psychology of the Internet*, ed. Y Amichai-Hamburger, pp. 1–25. New York: Cambridge Univ. Press

Smith S, Richardson D. 1983. Amelioration of deception and harm in psychological research: the important role of debriefing. *J. Personal. Soc. Psychol.* 44:1075–82

Spears R, Lea M. 1994. Panacea or panopticon? The hidden power in computer-mediated communication. *Commun. Res.* 21:427–59

Srivastava S, John OP, Gosling SD, Potter J. 2003. Development of personality in adulthood: set like plaster or persistent change? *J. Personal. Soc. Psychol.* 84:1041–53

Staub E. 1989. *The Roots of Evil: The Psychological and Cultural Origins of Genocide*. New York: Cambridge Univ. Press

Stern SE, Faber JE. 1997. The lost e-mail method: Milgram's lost letter technique in the age of the Internet. *Behav. Res. Methods Instrum. Comput.* 29:260–63

Steyvers M, Malmberg KJ. 2003. The effect of normative context variability on recognition memory. *J. Exp. Psychol. Learn.* 29:760–66

Strom L, Pettersson R, Andersson G. 2004. Internet-based treatment for insomnia: a controlled evaluation. *J. Consult. Clin. Psychol.* 72:113–20

Taylor H. 2000. Does Internet research work? Comparing online survey results with

telephone survey. *Int. J. Market Res.* 42:51–63

Tetlock PE. 1983. Accountability and perseverance of first impressions. *Soc. Psychol. Q.* 46:285–92

Tetlock PE. 1985. Accountability: a social check on the fundamental attribution error. *Soc. Psychol. Q.* 48:227–36

Tetlock PE, Kim JI. 1987. Accountability and judgment processes in a personality prediction task. *J. Personal. Soc. Psychol.* 52:700–9

Vaes J, Paladino MP, Castelli L, Leyens JP. 2003. On the behavioral consequences of infrahumanization: the implicit role of uniquely human emotion in intergroup relations. *J. Personal. Soc. Psychol.* 85:1016–34

Vazire S, Gosling SD. 2004. e-Perceptions: impressions based on personal Websites. *J. Personal. Soc. Psychol.* 87:123–32

Waters EA, Weinstein ND, Colditz GA, Emmons K. 2005. Formats for improving risk communications in medical tradeoff decisions. *J. Health Com.* In press

Wei M, Russel DW, Mallinckrodt B, Zakalik RA. 2004. Cultural equivalence of adult attachment across four ethnic groups: factor structure, structured means, and associations with negative mood. *J. Couns. Psychol.* 51:408–71

Williams KD, Cheung CKT, Choi W. 2000. CyberOstracism: effects of being ignored over the Internet. *J. Personal. Soc. Psychol.* 79:748–62

Williams KD, Govan CL, Croker V, Tynan D, Cruickshank M, Lam A. 2002. Investigations into differences between social and cyber ostracism. *Group Dyn.* 6:65–77

Zimbardo P. 1970. The human choice: individuation, reason, and order versus deindividuation, impulse, and chaos. In *Nebraska Symposium on Motivation*, ed. WJ Arnold, D Levine, 17:237–307. Lincoln: Univ. Nebraska Press

Annual Review of Psychology
Volume 57, 2006

# CONTENTS