Diffusion of Treatment Research: Does Open Access Matter?

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Advocates of the Open Access movement claim that removing access barriers will substantially increase the diffusion of academic research. If successful, this movement could play a role in efforts to increase utilization of psychotherapy research by mental health practitioners. In a pair of studies, mental health professionals were given either no citation, a normal citation, a linked citation, or a free access citation and were asked to find and read the cited article. After 1 week, participants read a vignette on the same topic as the article and gave recommendations for an intervention. In both studies, those given the free access citation were more likely to read the article, yet only in one study did free access increase the likelihood of making intervention recommendations consistent with the article. © 2008 Wiley Periodicals, Inc. J Clin Psychol 64: 821–839, 2008.

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Clinical researchers often express the concern that mental health practitioners do not pay sufficient attention to the results of treatment research. There is substantial evidence for a gap between clinical practice and the implications of clinical research. For example, comprehensive reviews of controlled clinical trials of therapies for alcohol problems have shown that some of the most commonly utilized therapies have the weakest empirical track records (Miller, Andrews, Wilbourne, & Bennett, 1998). Many plausible suggestions have been advanced to try to improve dissemination and reduce research/practice gaps, such as conducting effectiveness rather than efficacy

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research to improve external validity (Westen, Novotny, & Thompson-Brenner, 2004), improving treatment-development practices to take advantage of existing clinical wisdom (Morrison, Bradley, & Westen, 2003), and changing training-program organization to emphasize research literacy (Nathan, 2000).

In the research reported in this article, we evaluated whether it would help to take a simpler step—that of improving practitioners' literal access to journal articles reporting the latest advances in treatment. After all, it does not matter how representative the sample is or how well the reader understands the methodology if the article is not read. Busy practitioner schedules and the overwhelming output of journal articles reporting research on psychotherapy combine to make it highly likely that simple unawareness of new literature, or lack of easy access to it, represent important impediments to dissemination.

In the broader field of scientific publishing, researchers confronting similar dissemination issues with respect to their fellow researchers, applied scientists (e.g., medical care providers), and the lay public have argued that dissemination could be improved by increasing accessibility of research articles. The so-called Open Access (OA) movement seeks to make scholarly research results available on the Internet to anyone, anywhere, at any time, free of charge, and free of most copyright and licensing restrictions (Harnad, 2003). This can take the form of delayed OA journals such as the New England Journal of Medicine, which provides free access 6 months after initial publication; author-fee OA journals such as those found at BioMed Central; and self-archived *eprints*, whereby authors deposit pre- and postprints in a publicly accessible Web site (Willinsky, 2003).

The case for OA is sometimes argued as a justice issue (Mattaini, 2004). Indeed, the broad consensus that taxpayers should not have to pay for access to publicly funded research led to the federally mandated National Institutes of Health Public Access Policy, which requires all investigators to make their peer-reviewed manuscripts funded by the National Institutes of Health freely available to other researchers and the public through PubMed Central (National Institutes of Health, 2005).

From another angle, OA proponents have argued that removing access barriers will increase the diffusion of scholarly research among researchers and the public, thus maximizing research impact. A citation study by Thomson Scientific (2004) found that available OA journals in the *Web of Science* and in the *ISI Web of Knowledge* databases were more often among the lower ranking journals in the field by impact factor. Sixty-six percent of the OA journals ranked below the 50th percentile overall on impact factor. Furthermore, only 6% of OA journals were in or above the 91st percentile. However, these are correlational data that do not lend themselves to causal interpretation. It could be that low-impact journals are particularly likely to have taken the step of providing OA at an early stage of this trend, as a means of maximizing their readership, while some publishers of journals with larger impact factors might see OA as a threat to traditional sales of their product and thus be less likely to offer it.

A different method of studying OA in relation to citation impact controls for preexisting journal status. Harnad and Brody (2004) compared the citation counts of individual OA and non-OA physics articles appearing in the same (non-OA) journals.[1] They found citation advantages for OA articles of 200 to 300%, depending on the publication year. Similar studies have compared OA and non-OA articles in astronomy, computer science, electrical engineering, mathematics, philosophy,

[1]The OA articles in non-OA journals were made OA by their authors through self-archived eprints.

and political science, finding OA impact advantage rates of 25 to 250% (Antelman, 2004; Eysenbach, 2006; Hajjem, Harnad, & Gingras, 2005b; Kurtz et al., 2005a; Lawrence, 2001), with an average OA advantage of 93.2% in psychology (Hajjem et al., 2005a).

Aside from the effects of OA on citations by other scholars, some OA advocates have argued that OA will increase the spread of scientific research to professional practitioners and to the general population. No studies have empirically tested this possibility. At face value, the theory that greater accessibility of published articles will lead to greater readership and usage is compelling; however, a growing body of dissemination research has documented that passive diffusion of new research is largely ineffective and unlikely to result in behavior change (Gotham, 2004; Grimshaw et al., 2001; Kerner, Rimer, & Emmons, 2005, Stirman, Crits-Christoph, & DeRubeis, 2004). Furthermore, there are methodological difficulties in measuring the impact of particular articles on the general population; the traditional citation measure is not appropriate because nonresearchers do not write research articles. Many researchers have proposed usage rates (Web hits or download rates) as an alternative impact metric, the "Reading Factor" (Bollen, Van de Sompel, Smith, & Luce, 2005). Studies of the correlations between an article's (citation-based) impact factor and (download-based) reading factor have yielded mixed results—from insignificant to strong correlations—depending on the discipline, journals, and timeframe examined (Darmoni et al., 2000; Kurtz et al., 2000, 2005a, 2005b; Moed, 2005). Therefore, it should not be assumed that increasing accessibility will have the same effect on readership as on citation counts. To our knowledge, no studies have specifically examined correlations between impact factor and reading factor in psychology journals.

The present study aims to measure the influence of article accessibility on the diffusion of scholarly research towards mental health professionals. The term *diffusion* indicates a relatively passive process by which new knowledge is communicated through certain channels over time among the members of a social system (Rogers, 1995), in contrast to the term *dissemination*, which denotes more active, intensive efforts (Ellis et al., 2005). We measured diffusion impact in two ways: (A) the proportion of participants accessing and reading a specific research article and (B) the degree to which participant responses to hypothetical treatment questions on the same topic as the article corresponded with the arguments advanced in that article. Rather than trying to compare equivalent OA and non-OA articles in the same journal, we experimentally manipulated the accessibility of a single article. Participants received a *normal citation*, a *linked citation* that facilitated finding the article on the Internet, a *free access* citation that ensured participants could access the article without paying a fee, or a *no citation* control. We predicted that greater levels of access would lead to higher reading rates and thus more treatment recommendations consistent with the findings of the article.

We use the term *free access* instead of *open access* because OA removes both price barriers and permission barriers; an OA article must be permanently available to everyone on the Internet without most usage restrictions while the article in the present study was available only for a limited time to a subset of the participants.

We requested that participants find and read the article, but asked them to continue with the study even if they were not able to find and read it. In this way, we hoped to simulate the real-world scenario in which a professional might see a citation that he or she wanted to read, but was not required to read.

Study 1: Method

Design Overview

The study consisted of two sessions, 1 week apart. In Part 1, participants were given a normal citation, a linked citation, a free access citation, or no citation, and were asked to find and read the article within a week. After 7 days, participants were e-mailed a link and asked to return for the second session of the study, in which they read a clinical vignette and answered some related questions.

Participants

Three hundred participants were recruited through online classifieds and research listings[2] over a period of 5 months, responding to an ad for "Research on Treatment of Adolescent Substance Abuse" that involved reading a research article and answering some questions about a clinical vignette. A gift-certificate lottery was offered as compensation; entry into this lottery was guaranteed regardless of whether the study was completed. Participants were self-identified mental health practitioners or professionals-in-training at least 18 years old who were not currently employed as mental-health researchers. A total of 194 participants did not return for the second session of the study. This rather high dropout rate can be attributed to the facts that some Session 2 invitations were probably filtered into junk-mail folders and thus never read, some participants did not provide a valid e-mail address, and/or many participants may have been busy or uninterested when they received the Session 2 invitation. Dropout rates were not related to a difficulty in finding or reading the article, as no significant differences were found between groups on completion rate (see *condition differences* later in this article). Data from noncompleters were dropped from subsequent analyses, with a final sample size of 106. Participants listed their primary profession as organizational/industrial psychologist (1%), mental health nurse (2%), mental hospital staff (5%), psychiatrist (0%), social worker (18%), therapist/counselor (30%), professional-in-training (33%), and other mental health profession (11%). Their highest level of educational attainment was some high school (1%), some college (13%), 2-year degree (3%), 4-year degree (29%), some graduate school (18%), and graduate or professional degree (36%). Their average age was 32.5 ($SD = 10.0$, $mdn = 29$), and years of professional experience was 5.5 ($SD = 6.1$, $mdn = 3$). Seventy-seven percent were female, and 79% were Caucasian. Participants lived in the United States (94%), in Canada (4%), and in other countries (2%).

Materials

The study was conducted entirely on the Internet through psychologystudies.org, a custom Web site. Although the study was entirely automated, participants were provided with a contact e-mail address and phone number in case they had questions.

The research article used in the study was "Linking Session Focus to Treatment Outcome in Evidence-Based Treatments for Adolescent Substance Abuse" (Hogue, Liddle, Dauber, & Samuolis, 2004). This article analyzed psychotherapy sessions

[2]http://www.craigslist.org/, http://psych.hanover.edu/research/exponnet.html, and three others. Although no records were kept on referral sources, anecdotal evidence from correspondence with participants has suggested that the majority came from craigslist.org

with 51 inner city, substance-abusing adolescents. Its primary finding was that family focus (but not adolescent focus) predicted posttreatment improvement. We chose to use this article because it was available on the Internet, was characterized by a high level of scholarship, and had implications for evidence-based practice potentially applicable by mental health professionals from all theoretical orientations.

A vignette describing a hypothetical adolescent with substance abuse issues (a situation relevant to the article) was developed (see Appendix A). Eleven possible foci for therapy were described, 3 of which were supported by the findings of the article, namely: "Mike's relationship with his mother," "Mike's relationship with his father," and "Core relational themes, such as trust, respect and independence."

Procedure

In the first session, participants read the consent form, filled out demographic information, and entered their e-mail addresses. They were then randomly assigned to one of four conditions.

1. *Normal citation:* Participants were asked to read the Hogue et al. (2004) article, and were given a standard American Psychological Association (APA) style citation, with the additional instruction: "Please read the article at your leisure, sometime in the next week. **Important:** You will receive an email with instructions to finish the study in one week. Please continue with the study at that time *even if you are not able to read the article*" (bold and italics as in the original).
2. *Linked citation:* Same as Condition 1, except that the citation was linked directly to the online copy of this article in the PsycARTICLES database, available for a fee of $11.95 (or free for registered members).
3. *Free access citation:* Same as Condition 1, except that the citation was linked to a freely available copy of the article.
4. *No citation:* Participants received the instruction: "Part one of the study is complete. You will receive an automated email in 1 week with instructions to finish the study."

The second session took place 1 week later, thus giving participants adequate time to find and read the article. Participants were sent an e-mail with a link to the second session, with explicit instructions to continue even if they had not read the article. In this session, they were asked to imagine they were going to provide therapy to a 16-year-old boy named Mike who was brought in for treatment by his mother. They then read a brief, fictional vignette that described Mike's marijuana use, family problems, social life, and academic problems (see Appendix A). After this, they read these instructions:

> Following is a list of 11 possible topics for therapy with Mike. Please look at the whole list, and decide which topics you think would be most important to focus on. Then, please type a number, 1–11, in the box next to each item to indicate its rank—where "1" is the item you believe to be most important, and "11" the least important.

Each item represented an adolescent topic or a family topic, as outlined in Hogue et al. (2004). Next, participants were asked to indicate how important they thought it was to involve Mike's mother as a participant in therapy, on a scale from 1 (*not at all*), to 7 (*extremely*). This directly paraphrased one of the suggestions in the article.

Next, participants were asked whether they read the Hogue et al. (2004) article. If they read it, they were asked how they found it and whether they thought it influenced their responses to the clinical vignette. If they did not read the article, they were asked why not. Finally, participants were asked whether they believed the current research publication system adequately makes research articles available to working mental health professionals and, if not, how the system could be improved (free response).

Study 1: Results

Experimental Condition Differences

As mentioned earlier, roughly 65% of the participants who completed Session 1 did not return for Session 2. A chi-square test comparing the completion rate of the four conditions found no significant differences ($p > .5$), indicating that experimental condition did not influence retention.

We compared the demographic characteristics of the four conditions with ANOVAs and chi-square tests, and found no significant differences across conditions in age, sex, education, years of experience, ethnicity, nationality, theoretical orientation, and belief that science is important. However, the professional distribution was not equivalent, $\chi^2(12, N = 106) = 25.71$, $p < .05$. The free citation condition had more mental hospital staff than did the other conditions, and the no-citation condition had more participants with a profession of "other mental health field."

Article Reading

In the no-citation control condition, in which participants were not given the citation for the Hogue et al. (2004) article nor were asked to read it, none of them reported reading it. In the normal citation condition, 19% of the participants reported reading the article. In the linked citation condition, 27% reported reading the article. In the free access condition, 44% reported reading the article (see Figure 1). We compared reading rates in the four conditions with an omnibus chi-square and found that reading rates were affected by condition, $\chi^2(3, N = 106) = 15.66$, $p < .001$. Focused (1 *df*) planned comparisons between conditions revealed that participants given the normal citation were more likely to read the article than those not given a citation,

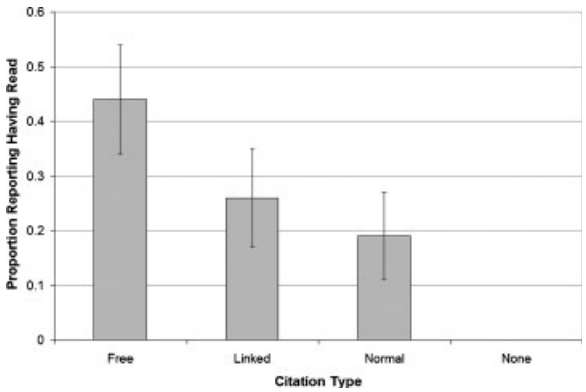

Figure 1. Study 1: Effect of citation type on reported reading rates. Error bars represent one standard error above and below the mean.

$\chi^2(1, n = 55) = 5.70$, $p < .05$. As predicted, participants given the free access citation were more likely to read the article than those given a normal citation, $\chi^2(1, n = 52) = 3.96$, $p < .05$, and were marginally more likely to read it than were those in the normal and linked conditions combined, $\chi^2(1, n = 78) = 3.73$, $p = .054$). No differences were found when directly comparing the linked and normal conditions, $\chi^2(1, n = 53) = 0.53$, $p =$ n.s. or the linked and free access conditions, $\chi^2(1, n = 51) = 1.63$, $p =$ n.s.

Participants who read the article reported that it influenced their responses to the clinical vignette somewhat, rating the influence a 3.1 ($SD = 1.4$) on a scale from 1 (*not at all*) to 5 (*very much*).

Clinical Vignette Responses

Participants indicated what to focus on in therapy with rank order (1–11) responses, so the Kruskal–Wallis nonparametric analysis of variance was used to compare the four conditions on all 11 items. No differences were found between conditions ($ps > .1$). Collapsing across conditions, each of the three therapeutic foci supported by the article were given a median rank of 5. Responses to the question about whether to include the mother "as a participant in therapy and a target for change" were compared with an ANOVA and also were not found to vary significantly across conditions, $F(3, 97) = 0.79$, $p =$ n.s., with an overall mean of 5.2 ($SD = 1.3$) on the 7-point scale.

We subsequently collapsed the four conditions and compared the responses of participants who reported reading the article with those who did not. Each of the 11 response items was compared with a two-tailed Mann–Whitney test, which revealed a significant difference: Participants who read the article focused more on the adolescent's school work and grades ($p = .02$, uncorrected). Note that because article reading was not directly manipulated experimentally, this result could be caused by self-selection rather than by article influence (i.e., participants who were more likely to find and read a research article also were more likely to focus on academics). Furthermore, the p value of this unplanned comparison may be misleading due to family-wise error.

Explanations of Barriers to Article Readership

Participants who were given a citation but did not report reading the article indicated the main reason why they did not (see Table 1). We compared the reasons given in these three conditions with an omnibus chi-square and found that the reasons given were affected by condition, $\chi^2(6, n = 49) = 27.455$, $p < .001$. Focused comparisons between pairs of conditions all revealed significant differences ($ps < .01$), indicating that while participants in the normal citation condition reported not being able to find the article or not having time, participants in the linked condition generally reported that the article was too expensive, and participants in the free access condition reported that they did not have time.

Fifty-two percent of all participants believed that the current research publication system adequately makes research articles available to working mental health professionals. Those who responded negatively gave open-ended suggestions as to how the current system could be improved, with 71% of these statements advocating reducing or eliminating access charges.

Table 1
Reasons Why Participants Reportedly Did Not Read the Article in Study 1, in the Three Conditions in Which Participants Received a Citation

	Free citation		Linked citation		Normal citation	
Report of why article was not read	Count	%	Count	%	Count	%
I didn't have time.	7	58	2	13	8	38
I didn't think it would be interesting.	0	0	0	0	0	0
I couldn't find it.	3	25	1	6	7	33
It was too expensive.	0	0	11	69	1	5
Other	4	33	2	13	5	24
Totals	12	100	16	100	21	100

Study 1: Discussion

As predicted, participants given the free access citation were more likely to report reading the article. In fact, they were more than twice as likely to report reading the article as were those given a normal citation, thus demonstrating the potentially large impact that reducing access barriers can have on reading rates by mental health professionals. Contrary to predictions, there was no difference in reading rates between the normal citation and linked citation conditions—indicating that the time or difficulty involved in locating an article from its citation may not have a significant impact on reading rates.

Contrary to predictions, article accessibility had no effect on participants' clinical vignette responses. Participants in all citation conditions gave the same recommendations for treatment focus as did a control group who received no citation at all. Post-hoc comparisons of those who read the article and those who did not (irrespective of condition) revealed only one significant difference: Those who found and read the article placed more importance on academics. This was probably a self-selected group bias because academic focus was not recommended by the article. These results are consistent with the findings of previous dissemination studies showing that passive diffusion is unlikely to produce behavior change and that Web-based diffusion specifically is ineffective in this regard (Backer, 2000; Buller, Buller, & Kave, 2005; Lewis et al., 2005). The fact that participants reported that the article influenced their answers, in contrast to the objective evidence that it did not, indicates that participants may not have fully understood or been able to effectively apply the findings of the article. Another explanation (suggested by a reviewer of this article) as to why groups did not differ on vignette responses is that participants might, in deciding what to focus on in treatment, be more influenced by their overall theoretical orientation than by information from a specific study.

One shortcoming of Study 1 is that it did not directly test participants' comprehension and retention of the article. Participants were not asked to follow the conclusions of the article in their responses to the clinical vignette, so we do not know whether the lack of observed effect resulted from (a) lack of comprehension of this fairly technical study; (b) memory decay between the time the article was read and the time of the clinical vignette responses up to a week later; or (c) a disagreement with the methods, conclusions, or applicability of the article with regard to the clinical vignette.

A second serious shortcoming of this study was the reliance on self-report for measuring article-reading rates. As participants in the free access condition had fewer excuses for not reading the article, they may have felt a greater need to report reading the article even if they had not in fact done so.

A third shortcoming was the high dropout rate. Although dropout was not affected by experimental condition, we could only speculate on the reasons participants failed to return for the second session, so our final sample may have been biased and not reflective of the general population of mental health professionals and professionals-in-training.

In an effort to address these concerns and assess the replicability of the results, we ran a second study, with some important changes. Participants were able to participate in the second study only after providing and confirming a valid e-mail address, thus ensuring that they would eventually receive the Session 2 invitation. After asking participants whether they read the article, we also gave them a multiple-choice test assessing comprehension/retention of the reading, thus providing an objective measure of diffusion.

We selected an article that we believed would be relevant to more participants and also more easily understood and applied, to assess whether this would lead to a difference between conditions on responses to the clinical vignette. Furthermore, we asked participants directly whether they planned to implement the findings of the article in their own practice.

Study 2: Method

Participants. Participants were recruited in the same way as for Study 1, but this time responding to an ad for "Research on Preventing Therapy Dropout." A gift-certificate lottery was again offered as compensation.

Participants were eligible to complete the study only if they provided a valid e-mail address, reported being over 18 years of age, reported being a mental health professional or a practitioner in training, and reported not being a mental health researcher. A total of 173 participants fit these criteria and began the study. Of these, 2 attempted to participate in the study more than once (identified by a repeated e-mail address or a repeated IP address and demographic data). In these cases, the first set of data for each participant was retained and analyzed while data from their repeated participation was excluded.

Fifty-eight participants dropped out after the first session, bringing the total number of valid completers to 115. While the completion rate in the no citation condition (88%) was significantly higher than the completion rates in the free citation (70%), linked citation (53%), and normal citation conditions (64%) ($ps < .05$), there were no significant differences between the three conditions in which participants were given a citation. All further analyses will concern only the 115 participants who completed the study.

Participants' average age was 33.7 ($SD = 10.3$, $mdn = 32$), and average years of professional experience was 7.8 ($SD = 8.1$, $mdn = 5$). Eighty-nine percent were female, and 80% were Caucasian. Ninety-two percent of the participants lived in the United States, 4% in Canada, and 4% in other countries. Participants listed their highest completed level of education as high school (1%), some college (7%), 2-year college degree (2%), 4-year college degree (10%), some graduate school (24%), and graduate or professional degree (57%). They listed their primary profession as therapist/counselor (33%), social worker (17%), mental health nurse (3%), mental

hospital staff (2%), psychiatrist (0%), professional-in-training (37%), and other mental health profession (9%). The primary theoretical orientation was behavioral (11%), cognitive-behavioral (39%), eclectic (25%), humanistic/existential (4%), interpersonal (9%), psychodynamic (5%), other (3%), and none (3%). While 90% of participants indicated they had given therapy or counseling at some point, only 64% said they were currently doing so. On average, those who had given counseling estimated that 23% of their clients dropped out of therapy prematurely. Of those who had given counseling, 56% believed that premature dropout was a problem in their practice.

Materials

As before, the study was conducted entirely online, using psychologystudies.org, a custom Web site. The article used was "Preventing Therapy Dropout in the Real World: The Clinical Utility of Videotape Preparation and Client Estimate of Treatment Duration," by Reis and Brown (2006). The article was chosen because it had clear recommendations for improving practice and was likely more relevant and accessible to participants than was the article used in Study 1.

Knowledge test. A knowledge test about the reading was developed by generating seven multiple-choice questions with four response options for each question, and pilot testing them with a convenience sample of 10 graduate students—5 of whom read the article before taking the test. Five of the seven items were found to reliably distinguish between those who had read the article and those who had not, so these items were retained for the final version of the test used in the main study. The test questions and answers were then sent to Brenda Reis, the first author of the Reis and Brown (2006) article. She confirmed the validity of the questions and answers, and made some minor suggestions for improvement, which were implemented.

Vignette and recommendations. A vignette describing a hypothetical problem involving a clinic with a high dropout rate (a situation relevant to the article) was developed (see Appendix B). Twelve possible solutions were described, 2 of which were mentioned in the article. Only 1 of the solutions was empirically supported by the study described in the article: namely, a 12-min videotaped instruction (*Tell It Like It Is*; Acosta, Yamamoto, Evans, & Skilbeck, 1983) prior to beginning therapy, introducing patients to behaviors considered desirable in psychotherapy. The vignette and possible solutions were reviewed by Brenda Reis as well, who gave her approval.

Procedure

The procedure was the same as that for Study 1, with the following additions: Before beginning the study, participants were required to enter their e-mail address. A confirmation e-mail was then sent to that address, with a link participants had to click to participate in the study, thus ensuring we had a valid e-mail address for each participant. After reading the clinical vignette in Session 2 and giving their responses, participants were asked whether they had ever treated patients in psychotherapy, and if so, whether they had found therapy dropout to be a problem in their practice. If they reported having conducted therapy, they also were asked which methods for preventing therapy dropout they had tried in the past and which methods they intended to try in the future. Finally, participants had to complete a test assessing

their knowledge of the cited article. They were asked to complete the test as best they could even if they had not read the article. They also were asked not to read the article as they took the test, even if the article was easily available to them.

Study 2: Results

Article Reading

A chi-square test revealed that article accessibility had a significant effect on reported reading rates, $\chi^2(3, N = 115) = 32.31$, $p < .001$. As predicted, pairwise comparisons confirmed that a higher proportion of participants given the free citation ($n = 30$) reported reading the article (70%) than those given the linked citation ($n = 28$; 14%), $p < .001$, the normal citation ($n = 29$; 45%), $p = .04$, or no citation ($n = 28$; 7%), $p < .001$. Although those given the normal citation were more likely to report reading the article than those given the linked citation or no citation ($ps < .01$), there was not a significant difference between those given the linked citation and those given no citation.

Knowledge Test

Knowledge tests were scored from 0 to 5, with 1 point for each correct answer. As each question contained four response choices, a person answering at random would score an average of 1.25. An analysis of variance showed that article accessibility had a significant effect on knowledge test scores, $F(3, 111) = 7.78$, $p < .001$ (see Figure 2). As predicted, participants given the free citation scored significantly higher on the reading test ($M = 2.80$, $SD = 1.47$) than those given the linked citation ($M = 1.54$, $SD = 1.04$), $t(52) = 3.80$, $p < .001$, the normal citation ($M = 1.86$, $SD = 1.33$), $t(56) = 2.57$, $p = .01$, or no citation ($M = 1.46$, $SD = 0.79$), $t(45) = 4.34$, $p < .001$. Comparing the free citation condition to each of the three other conditions, effect sizes (Cohen's *d*) were large, ranging from 1.5 to 1.6. There were no significant differences in test scores between the linked, normal, and no citation conditions.

In all conditions, half of those who reported reading the article said they only skimmed it (rather than reading it thoroughly). Article reading was then coded as 0 (*didn't read*), 1 (*skimmed*), or 2 (*read thoroughly*) and found to be positively correlated with reading test scores ($r = .61$, $p < .001$), indicating that participants who

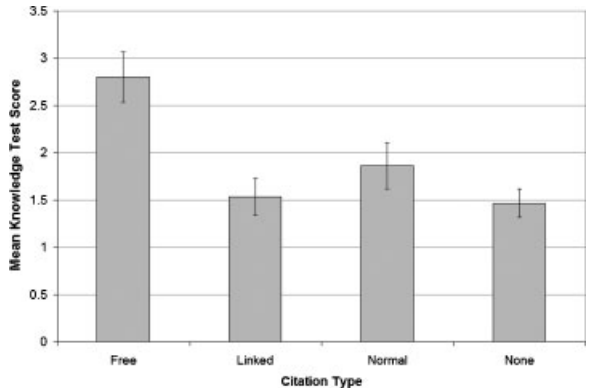

Figure 2. Study 2: Article accessibility affects knowledge test scores. Error bars represent one standard error above and below the mean.

reported reading the article and reading it more thoroughly were likely to do better on the knowledge test.

Clinical Vignette Responses

Participants indicated which plans for reducing dropout they would recommend with rank order (1–12) responses, so the Kruskal–Wallis nonparametric analysis of variance was used to compare the four conditions. Article accessibility had a significant effect on level of support for using videotaped instruction to reduce therapy dropout, $H(3,\ n = 115) = 14.52,\ p = .002$ (see Figure 3). As predicted, participants given the free citation ranked videotaped instruction higher ($mdn = 2$) than those given the linked citation ($mdn = 6.5$), $H(1,\ n = 58) = 9.59,\ p = .002$, the normal citation ($mdn = 6$), $H(1,\ n = 59) = 4.93,\ p = .03$, or no citation ($mdn = 7$), $H(1,\ n = 58) = 12.31,\ p < .001$. There were no significant differences between the linked, normal, and no citation conditions. Furthermore, there were no significant differences between conditions on level of support for any of the 11 other therapy dropout reduction plans.

Collapsing across conditions, those who reported reading the article thoroughly ranked videotaped instruction significantly higher ($mdn = 1$) than did those who reported skimming the article ($mdn = 3.5$) or not reading it ($mdn = 7$), $H(2,\ n = 115) = 27.37,\ p < .001$, all pairwise comparisons being significant at $p = .02$ or better.

Only 4% of participants reported having tried videotaped instruction. This meant videotaped instruction was the second least common intervention that participants reported having tried (No participants reported having tried a finishing bonus.) The most commonly attempted intervention to reduce therapy dropout was to "attempt to contact clients after they drop out and survey them to find out their reasons," which 46% of participants reported having tried.

A chi-square test showed that article accessibility had a significant effect on participants' intentions to try videotaped instruction within the next 6 months, $\chi^2(3,\ n = 115) = 19.77,\ p < .001$. A greater proportion of participants given the free citation said they planned to try videotaped instruction (33%) than were those given the linked citation (4%), $\chi^2(1,\ n = 58) = 8.35,\ p = .004$, the normal citation (7%), $\chi^2(1,\ n = 59) = 6.36,\ p = .01$, or no citation (0%), $\chi^2(1,\ n = 58) = 11.28,\ p = .001$.

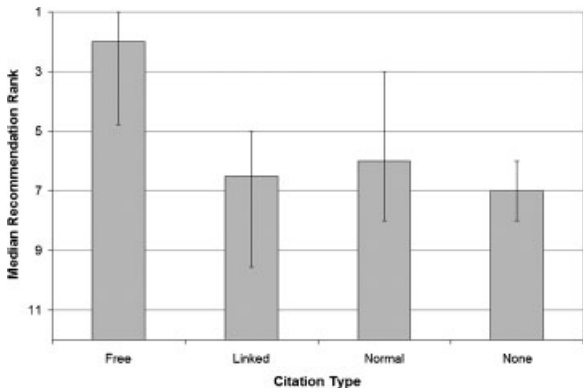

Figure 3. Study 2: Article accessibility affects support for videotaped instruction. Error bars represent the 95% confidence interval of the median.

Collapsing across conditions, participants were more likely to say they would try videotaped instruction if they reported reading the article (25%) than if they did not (4%), $\chi^2(1, n = 115) = 11.47$, $p = .001$. There was not a significant difference between those who reported reading the article thoroughly and those who reported skimming it. Overall, the most popular intervention that participants said they would try in the next 6 months was to "have each client & therapist mutually agree on a treatment duration estimate during the intake session," which was endorsed by 30% of participants, and did not vary significantly by condition. Note that this intervention was tested, but not supported, by Reis and Brown (2006).

Individual Differences

There were no significant differences in sex, age, ethnicity, nationality, education, profession, or years of experience. Among participants who had given therapy at some point, those who found therapy dropout to be a problem in their practice were marginally more likely to report reading the article ($n = 57$; 44%) than were those who did not think dropout was a problem ($n = 45$; 27%), $\chi^2(1, n = 102) = 3.23$, $p = .07$, and scored marginally higher ($M = 2.19$ vs. $M = 1.76$) on the knowledge test, $t(98) = 1.71$, $p = .09$. They ranked videotaped instruction significantly higher ($mdn = 4$ vs. $mdn = 7$), $H(1, n = 102) = 6.77$, $p < .01$, and were significantly more likely to say they intended to try it themselves within the next 6 months (19 vs. 4%), $\chi^2(1, n = 102) = 4.99$, $p = .03$.

Explanations of Barriers to Article Readership

Those participants who reported having read the article indicated how they accessed it (see Table 2). Overwhelmingly, those participants who read the article found it on the Internet and were able to access it for free. Only 1 participant reported paying for the article. Those participants who did not read the article listed the main reason why they did not (see Table 3). Broadly speaking, those who were not given a citation stated that they had never heard of the article, those given a normal citation stated that they did not have time, those given a linked citation stated that it was too expensive, and those given a free citation stated that they did not have time.

Forty-five percent of the participants said the current research publication system adequately makes research articles available to working mental health professionals (This proportion did not vary by condition.) The other 55% gave free responses to suggest how the current system could be better; 75% of these suggestions mentioned reducing the cost in one way or another.

Study 2: Discussion

In a replication of Study 1, participants given the free access citation were significantly more likely to report reading the article than were those in the other three conditions. Reading rates in the free access condition were roughly 2.4 times the average of those in the linked and normal citation conditions. Furthermore, participants given a free access citation also scored higher on a knowledge test than did those in the other conditions, providing objective verification that they were more likely to read and understand the article. This finding suggests that the results of Study 1 were not simply due to demand characteristics or other self-report biases. Clearly, the article's accessibility had a significant impact on mental health professionals' likelihood to read it.

Table 2
How Participants Reportedly Found the Article in Study 2, in Each of the Four Conditions

	Free citation		Linked citation		Normal citation		No citation	
Report of how article was accessed	Count	%	Count	%	Count	%	Count	%
I found it on the Internet and was able to access it for free.	18	86	3	75	7	54	0	0
I found it on the Internet but had to buy it.	0	0	0	0	1	8	0	0
I found it at a local library.	1	5	0	0	3	23	2	100
Other	2	10	1	25	2	15	0	0
Totals	21	100	4	100	13	100	2	100

Table 3
Reasons Why Participants Reportedly Did Not Read the Article in Study 2, in Each of the Four Conditions

	Free citation		Linked citation		Normal citation		No citation	
Report of why article was not read	Count	%	Count	%	Count	%	Count	%
I've never heard of it.	1	11	0	0	1	6	21	91
I didn't have time.	5	56	5	23	8	50	2	09
I didn't think it would be interesting.	0	0	0	0	0	0	0	0
I couldn't find it.	3	33	1	5	3	19	0	0
It was too expensive.	0	0	13	59	0	0	0	0
Other	0	0	3	14	4	25	0	0
Totals	9	100	22	100	16	100	23	100

Note. Five participants did not give a reason.

Unlike Study 1, article accessibility had a significant effect on participants' recommended responses to a relevant hypothetical scenario, and also influenced their intentions to implement the findings of the article in their therapeutic practice in the next 6 months. Why did we see this difference between the two studies? To be sure, research accessibility is necessary, but not sufficient, for influencing practice or even practice intentions. The article used in Study 2 was likely easier to understand, easier to apply, and relevant to more of the participants. In support of the hypothesis that article relevance influenced diffusion, participants in Study 2 who believed therapy dropout was a problem were significantly more likely to give intervention recommendations and change their real-life practice in ways consistent with a research article on the same topic. Nevertheless, it must be remembered that there is no evidence whether participants' stated intentions to change their therapeutic practice actually translated into real change.

Unlike Study 1, participants given a normal citation were more likely to report reading the article than were those given a linked citation; however, this finding should be taken with a grain of salt, as knowledge test scores did not differ significantly between the two conditions. One explanation (suggested by a reviewer) for the difference in reported reading rates is that participants given the linked citation may have been less likely to search for free versions of the article (thinking it

was only available at a price)—even if they could have accessed it through their usual search mechanisms, which might be free (e.g., access to databases through their workplaces). In support of this explanation, those given the linked citation were the only group to report that cost was the main deterrent to reading the article (see Table 3). Furthermore, only 1 linked citation participant reported finding the article through a library or "other" means, compared with 5 normal citation participants who reporting using these methods (see Table 2). This explanation, that *perceived* cost may decrease search efforts, underscores the point that price is a barrier to diffusion. Dissemination efforts that come with a price tag may prove less effective, even if they are promoted more heavily, than dissemination efforts that are free.

Given that none of the results showed any advantage for the linked citation over the normal citation, it is clear that locating the target article was not a significant diffusion barrier. Further supporting this notion was the data that 75% of the suggestions for improvement to the research publication system concerned cost while none mentioned being unable to locate the article.

The dropout rate in Study 2 (34%) was much lower than that in Study 1 (65%), but still notable. It is likely that noncompleting participants were busy or uninterested when they received the Session 2 invitation. It also is possible that some of the noncompleters used an infrequently checked, secondary e-mail address to sign up for the study, and so did not read the Session 2 invitation in time. Participants in the no citation control condition had lower dropout rates than did those participants who were asked to find and read a citation—even though participants given a citation were asked to complete the study even if they were not able to read the article. This may indicate that participants were self-conscious about returning for the second session without fulfilling the request of the study or were put off by the request to find and read the article; however, completion rates did not vary significantly by citation type, so there is no evidence that the normal or linked citations were significantly more discouraging to participants than were the free access citations. Future studies could maximize internal validity by running the study in a single session, and requesting that participants find and read the article immediately and answer the questions right afterward. Additional dependent variables could be added to this design, such as dropout rates and time spent finding and reading the article.

General Discussion

The aim of these analogue experiments was to determine the effect of article accessibility on reading rates by mental health professionals and on their treatment recommendations in a relevant context. The accessibility manipulation contained some atypical features (A reference to one specific study was provided directly to participants, with the prospect of a 1-week follow-up inquiry related to it.), but overall, we believe it had reasonably good external validity. Self-identified mental health professionals completed the study from their home or office, had a week to find and read the article in the course of their normal lives, and external incentives were not contingent upon their having read the article. Furthermore, as participants were initially recruited for studies about "Treatment for Adolescent Substance Abuse" or "Preventing Therapy Dropout," the sample was probably representative of a population with some intrinsic interest in the subject matter.

As found in the first study and replicated in the second study, the cited article was read by roughly twice as many participants in the free access citation condition as

those in the normal and linked citation conditions. This bolsters the position of OA advocates, showing that OA may lead to greater research diffusion not just in the research community but in the professional community as well. No advantages were observed for participants given a linked citation over those given a normal citation, indicating that locating articles may not be a significant barrier to research diffusion.

Changes in article accessibility did not consistently translate into altered treatment recommendations. In Study 1, neither article accessibility nor self-reported reading rates predicted meaningful changes in responses to a relevant scenario while in Study 2 both did, a difference that may be attributed to the more straightforward, more relevant content of the article used in Study 2. There was no evidence, however, as to whether participants' attitudes and intentions in Study 2 translated into real-world behavior. According to Backer (2000), "the single, most common failure of past dissemination strategies . . . was the assumption that getting information out was enough to create change" (p. 364). Even among more active research dissemination efforts, no strong evidence yet exists to recommend any one strategy as effective in a variety of circumstances (Ellis et al., 2005).

Taken together, the data on readership and on treatment recommendations suggest that OA could increase consumption of treatment research, which is a necessary, but not sufficient, condition for that research to influence clinical practice. Do particular types of articles influence practice more than do others? What would maximize reading versus skimming of the articles? Future research needs to focus not only on easing access to relevant research but also on understanding factors (e.g., access to training in the approach, acceptability to consumers) associated with implementation of the methods supported by research.

A more immediate practical implication of the present study is that scholars wishing to maximize the diffusion of their research among the professional community should deposit eprints of their work in OA archives. There are no copyright or other legal barriers to this OA strategy, with 91% of research journals (including all APA and Wiley journals) already giving their explicit green light to authors self-archiving of pre- or postprints (Eprints, 2008). One hundred percent OA is a reachable goal.

Appendix A

Complete Text of the Clinical Vignette Used in Study 1

Mike is brought in for his first visit by his mother. He has generally been a good student in school, but his grades have fallen recently. He is active in the soccer club, and has a large group of friends. Even so, Mike reports chronic feelings of sadness and loneliness.

He smokes marijuana almost every day, often with friends but sometimes alone. He was arrested recently for marijuana possession, but charges were dropped. Mike's parents divorced when he was 4 years old, and since then Mike sees his father only on weekends.

Mike has no brothers or sisters, but has a close friend named Luke whom he has known since early childhood. Mike considers Luke to be his closest attachment. 3 weeks ago, Luke was convicted of drug dealing, and is now serving his sentence in jail—this precipitated Mike's coming to therapy.

Appendix B

The complete text of the clinical vignette used in Study 2

Imagine you are the supervisor of a mental health clinic in a large health maintenance organization. There are around 20 therapists under your supervision, coming from a variety of theoretical backgrounds: psychodynamic, cognitive behavioral, family systems, and eclectic. The clients are mostly middle class, and the primary problems they report are anxiety, depressed mood, parenting issues, marital problems, and relationship problems.

The clinic has been experiencing somewhat high client dropout rates for the last few years—according to therapist reports, around 60% of clients terminate therapy prematurely. Your boss is concerned about the situation, and has requested that you institute changes in the clinic to improve client retention, while minimizing the costs of the changes.

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