Article

European Journal of Criminology

Replication in criminology: A necessary practice

European Journal of Criminology
2015, Vol. 12(5) 581–597

DOI: 10.1177/1477370815578197
euc.sagepub.com
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Abstract

Although researchers acknowledge the importance of replication in building scientific knowledge, replication studies seem to be published infrequently. The present study examines the extent to which replications are conducted in criminology. We conduct a content analysis of the five most influential journals in criminology. We also compare the replication rate in criminology with that in the social sciences and natural sciences. The results show that replication research is rarely published in these disciplines. In criminology journals in particular, replication studies constitute just over 2 percent of the articles published between 2006 and 2010. Further, those replication studies that were published in criminology journals in that period tended to conflict with the original studies. These findings call into question the utility of empirical results published in criminology journals for developing theory and policy. Strategies for promoting replication research in criminology are suggested.

Keywords

Content analysis, quantitative methods, replication, research methods

Introduction

Replication is an essential component of the scientific process. Scholars agree that the results of any empirical study cannot be fully trusted until they have been replicated in additional studies. The concept of replication is so familiar to the scientific community that its meaning seems obvious, making formal, agreed-upon definitions rare. For example,

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Schweizer (1989) compiled a list of definitions for replication in the social sciences. Most of these include a component regarding the reproduction of an experimental procedure; additionally, many definitions stress the use of different, independently collected data.

It is important to note that not all studies should necessarily be expected to replicate. For example, ethnographies and other qualitative work or work with a historical focus often examine specific groups and contexts without making claims about the generalizability of any observations made. Certainly, some criminological research meets these criteria and should not be expected to be subjected to replication. However, a great deal of criminology research is meant to test general theories or evaluate interventions and initiatives, and these types of studies are in need of replication. Additionally, because criminology is an applied field, findings from research studies may be applied by criminal justice agencies. Policy and practice should not be guided by information that has not been properly validated. Therefore, the greater degree of confidence that is provided by replications is needed. For this reason, replication of highly publicized studies is even more important, as such research is more likely to come to the attention of policymakers and practitioners. Further, replication would allow practitioners to have more confidence in the original findings, lending credibility to the research process and making the integration of research results into policies and practice more attractive.

There have been important replications conducted in criminology research that shed light on the importance of replicating findings before making policy implications. First, early studies showed that arrests were more likely to occur when police arrived at a crime scene shortly after a call for service is made (Clawson and Chang, 1977; Isaacs, 1967). However, subsequent replications (for example, Pate et al., 1976; Spelman and Brown, 1981) failed to find a significant relationship between response times and arrest, or found that the relationship held for only certain types of crime, such as those involving direct contact between the victim and offender. Second, in the Minnesota Domestic Violence study, Sherman and Berk (1984) examined the effectiveness of multiple police responses to domestic violence calls. Their findings showed that offenders who were arrested were less likely to reoffend than were those who were given counseling or temporarily sent away. Several replications of the study, some of them NIJ-funded, have since been conducted. Many of these failed to support the findings of the original experiment (for example, Dunford, 1992; Hirschel et al., 1992; Sherman et al., 1991); those that *did* find results in the same direction reported weaker relationships between arrest and repeat offending than did the original study (for example, Berk et al., 1992; Pate et al., 1991). These results demonstrate the potential unreliability of single studies; the findings of some studies may be sensitive to the context in which they are conducted or the specific research methods used. This highlights the importance of replicating criminological studies in an effort to provide more reliable results on which to base policy and practice. Although these examples are well known and the importance of replication is largely agreed upon, it is currently unknown whether the results reported in criminology journals suffer from a lack of replication.

Owing to the importance of replication and the concern over the frequency of replication research, we conduct an exploratory study that examines the number of replication studies that have recently been published in top-tier criminology and criminal justice journals. By doing so, we hope to provide initial insight regarding the extent to which the

findings published in criminology journals can be considered reliable. Additionally, we extend previous research by comparing across broad disciplines (natural science, social science, and criminology) to gain additional understanding of replication in criminology journals relative to other journals. Finally, because previous research suggests that replication studies are more likely to be published when they contradict the findings of the study they replicate (Hubbard and Armstrong, 1994; Hubbard and Vetter, 1996; Madden et al., 1995; Neuliep and Crandall, 1990; Reid et al., 1981; Wilson et al., 1973), we compare the results of the criminology replication studies we identify with the findings of the studies they replicate.

Performance and publication of replication research

Replication is an important part of the scientific process because it establishes stability in our knowledge of nature by using repeat testing to rule out the possibility that results are merely due to coincidence (Popper, 1959; Radder, 1996). It thereby increases the level of confidence one can have in a set of empirical generalizations (Rosenthal, 1991). Replication also functions as a norm to differentiate between scientific and unscientific claims; statements that cannot be supported by replication can be determined unscientific (Radder, 1996). An additional benefit of replication, according to Schmidt (2009), is its ability to address possible issues with internal and external validity. The replication of studies serves as a control for sampling error, artifacts, and academic fraud. It also allows findings to be generalized to a larger or different population than was used in the original study.

Scholars in several disciplines – notably social sciences such as business, finance, marketing, and organization – have addressed the issue of publication of replication studies. In general, the conclusion from this line of inquiry is that there may be a bias against replication research. The authors attribute this bias to academia's focus on uniqueness – studies that are not seen to contribute unique information are not as highly valued as those that provide new information (Mone and McKinley, 1993); in addition, studies that examine a new and different topic are considered more 'interesting,' and therefore more worthy (Hagan, 1973).

This tendency has also been recognized in criminology research. In his 2010 Sutherland Address, Francis T. Cullen described the state of the field as 'adolescence-limited criminology,' which is, in part, characterized by an emphasis on the creation of new theories rather than the development of knowledge that has already been generated. According to Cullen, criminology journals reward single studies with publication, especially if those studies develop and test a new theory or examine an understudied type of crime or population. He argued that the results of existing studies are considered 'old news;' therefore, the relationships examined therein are taken for granted and are not further examined. The emphasis on originality, the devaluation of replication research it creates, and the subsequent potential inaccuracy of some published research may be detrimental to knowledge development and cumulation, as well as to the development of policy. This potential harm is exacerbated by the need for scholars to secure as many publications as possible. The need to publish many studies leads scholars to avoid research that is unlikely to be accepted for publication, regardless of the potential benefit to theory or practice that would be provided by such work.

This focus on new information – and the subsequent potential bias against replication research – among academic journals is especially problematic given the importance of publication in academic journals for career advancement. When making decisions on hiring, tenure, or promotion, university committees place a great deal of emphasis on how frequently candidates are able to publish their work in scholarly journals, and also consider the level of the journals in which their research is presented. This causes scholars to gauge the possibility of publishing their work in a prestigious journal before embarking on research projects. Because of the necessity of publishing multiple articles in top-tier academic journals, they are hesitant to spend valuable time engaging in research that is unlikely to be published, such as replications of earlier work. Therefore, the extent to which replication research is rewarded with publication in prestigious academic journals is important for understanding whether research published in academic journals is being replicated.

Submission of replication studies to academic journals

Existing evidence suggests that scholars in many fields may be hesitant to engage in replication research. Conducting replication research may not be considered an effort that is likely to enhance one's career. As will be discussed in the following sections, the most tangible and career-enhancing reward of conducting research – publication – may be unlikely to result from replication research. In fact, journal editors interviewed by Madden and colleagues (1995) believed that faculty members whose research consisted of many replications were unlikely to receive tenure, because it signals a lack of scholarly creativity or originality. It is therefore unsurprising that replication studies are rarely submitted to journals for publication. For example, Neuliep and Crandall (1990) surveyed 288 current and former editors of journals in the social and behavioral sciences. Almost half of these editors (42 percent) reported that they had never received a direct replication for review. Additionally, Madden and colleagues' (1995) interviews with editors in the social and natural sciences found similar results; editors in both disciplines reported receiving very few replications.

Acceptance of replication studies

Even when replications are submitted, interviews with editors and reviewers suggest that these studies may be unlikely to be accepted for publication. According to Kerr, Tolliver, and Petree's survey of reviewers of management journals (1977), reviewers are unlikely to recommend publication for papers that are merely replications of earlier studies. A survey of reviewers of psychology journals showed a similar reluctance to publish direct replications if they added no new dimension to theory (Rowney and Zenisek, 1980). Editors report that replication studies are unlikely to be accepted unless they represent an extension through the addition of new variables or presentation of novel findings (Madden et al., 1995; Neuliep and Crandall, 1990). A notable exception, according to the editors, is when articles report replications conducted in controversial areas – in that case, replication studies are considered important contributions to the field.

Although the findings discussed above were generally consistent across both natural and social science journals, the willingness to publish replication research may vary by academic discipline. According to Madden et al. (1995), editors in the natural sciences reported publishing replications less often than did social science editors. This may be due to the nature of research in that discipline; there is less need for literal replication in the natural sciences because all work follows closely from earlier related work, making replication a built-in part of the research process. In contrast, the social science editors reported that they would be willing to consider publishing more replication studies if such studies were submitted to their journals more often. They were also more likely than editors of natural science journals to be concerned about the absence of replication, and they reported a desire to encourage replication research for that reason. However, this concern does not seem to have translated into practice; in another study, only 5 percent of editors said that they explicitly encouraged the submission of replication studies (Neuliep and Crandall, 1990).

Evidence from content analyses

The conclusions drawn from comments by journal editors have been supported by results of previous content analyses. Several studies, mostly focusing on the social sciences, have shown that replications are published infrequently. In a review of psychology journals, Sterling (1959) found that, out of 362 research articles published in a one-year period, none were replications of earlier work. A later study analyzing psychology journals found that only 1.6 percent of studies contained the word 'replication,' and 1.07 percent actually replicated earlier studies (Makel et al., 2012). Wilson and colleagues' (1973) analysis of sociology journals found only 4 replications out of 76 articles (5.2 percent); when examining variable relationships within journal articles, 6.6 percent were replications of earlier work. In a review of journals in advertising, marketing, and communication, Reid et al. (1981) reported that only 30 of 501 articles (approximately 6 percent) could be classified as replications. Another study examining journals in various business disciplines found no true replications; replications with extensions represented 5–10 percent of the articles, depending on the specific discipline (Hubbard and Vetter, 1996). Similarly, Hubbard and Armstrong (1994) found no true replications in three major marketing journals, and reported that extensions constituted only 1.1 percent of the journal space. In addition, the publication rate of replications in marketing journals had declined since the 1970s. According to Horton and colleagues (1993), of the 130 studies published in a five-year period in the *Journal of Research in Science Teaching*, only 3 percent were intended by the author to be a direct replication of an earlier study. Finally, Kelly's examination of the three top journals in behavioral ecology (2006) found no true replications, with most studies categorized as quasi-replications.

Failure to replicate

There is growing recognition across disciplines that the findings of published studies often do not replicate, calling into question the accuracy of research reported in academic journals. The results of some studies may not be replicable for many reasons: contextual

differences in the locations or environments in which the studies were conducted, an inability to exactly imitate the original study's methods, or even scientific fraud – a meta-analysis of surveys of scientists shows that almost 2 percent of scholars have fabricated, falsified, or modified their data (Fanelli, 2009). According to Lehrer (2010), research suffers from the 'decline effect,' in which results of single studies are significant by chance alone and replications of the study fail to find significant results owing to regression to the mean. In addition, single studies may be unreliable owing to 'significance chasing' (Ioannidis, 2005), or the practice of re-analyzing data to find statistical significance because of the difficulty of publishing null results. Similar to Rosenthal's discussion of the 'file drawer problem' (1979) – in which studies with null findings are never published – results of studies that fail to replicate earlier results may not be known, masking the existence of Type I errors published in academic journals.

Consistent with the perceptions of editors and reviewers discussed in the sections above, content analyses support the idea that replications are more likely to be considered for publication if their results contradict the original study. Of the 30 replication studies in Reid et al.'s (1981) study, 40 percent supported the original, 20 percent provided partial support, and 40 percent conflicted with earlier results. Hubbard and Armstrong (1994) found that only 3 of 20 extensions published in marketing journals provided full confirmation for the original studies. In Hubbard and Vetter's (1996) analysis, approximately 27 percent of the replication studies supported the original findings; 45.5 percent of the replication studies provided conflicting results and 27.4 percent were able only to partially confirm the earlier study. Similarly, Wilson et al.'s (1973) analysis of replications in sociology found that over a quarter of the replicated variable relationships that were examined reversed the original results (either from significant to non-significant or vice versa).

Whatever the reason for the inconsistency in replicated studies, it is apparent that many disciplines suffer from a potential for errors that can be alleviated by replicating important studies. However, it is currently unknown whether and to what degree this problem applies to findings reported in criminology journals.

The current study

The research reviewed above demonstrates the infrequency with which replication studies have been published in several different disciplines. Scholars have noted the problems that arise from a lack of replication; most notably, it is unknown whether findings published in reputable journals are reliable. In the current study, we attempt to extend this literature to the field of criminology by exploring how criminology journals compare with journals in other disciplines in regards to the publication of replication studies.

Following the literature described above, four hypotheses were developed. First, content analyses of journals in other fields suggest that replication is rare; therefore, we expect to find a small percentage of articles in criminology journals that qualify as replications. Second, we expect to find a larger percentage of replication studies in social science journals than in natural science journals. As mentioned previously, editors of journals in the social sciences are more concerned about replication research, leading to the conclusion that such journals may contain more published replications than do

journals in the natural sciences. Third, we compare criminology with the broader social sciences. It is unclear whether to expect criminology journals to contain more or less replication research. On the one hand, owing to the practicality of research published in criminology and criminal justice journals stemming from the use for criminal justice policy, one could expect a greater proportion of replication studies in such journals than in the social sciences in general. On the other hand, because of the relative youth of the field of criminology and of criminology journals, the development of new theories may be emphasized more greatly in criminology journals, leading to less replication research than is conducted in the social sciences. Fourth, based on the results of previous content analyses and the preferences of editors and reviewers, it is expected that a majority of replication studies in criminology will not provide support for the studies they replicate. As discussed above, previous research indicates that replication studies are more likely to be published when they contradict earlier findings.

Sample

This study begins to address the research questions by examining highly influential journals in each field. Journals were selected using the Journal Citation Reports® (JCR), an online resource that provides citation data for various journals. Two editions are offered: JCR Science Edition and JCR Social Science Edition. Both editions provide multiple measures of a journal's impact on science, such as the journal impact factor, five-year journal impact factor, and aggregate impact factor. We used the rankings obtained from the Article Influence Score (AIS). Although the impact factor is the more common metric when considering journal influence, the AIS ranking was chosen because it adjusts for citations of articles published in the same journal and controls for the number of articles in each journal issue (Thomson Reuters, 2013). We felt the latter adjustment was very important for our purposes, because the number of articles published per issue varies substantially across journal and discipline.

A list of the journals included and their corresponding AIS can be found in Table 1. Initially, the top five journals were selected from JCR Science, JCR Social Science, and JCR Social Science – Criminology/Penology. However, some of these journals were removed from the sample because they did not contain original work; instead, they comprised reviews of research. This decision was not meant to discount the contributions of reviews, but rather to align with our definition of replication presented below; journals that solely included reviews would necessarily not contain any studies that replicate earlier work. Journals that included a combination of original research and reviews were included in the study, but reviews were left out of calculations of the number of articles in the journal and rates of replication. Replacement journals were selected from additional rankings.

Defining replication

Before exploring replication publication rates in academic journals, it was necessary to adopt a formal definition of replication. To do so, a substantial review of the social science literature was conducted to determine how replication has previously been defined.

Table 1. Journals included in the analysis.

Journal title	2010 Article Influence Score©
Criminology	
Criminology	1.85
Journal of Quantitative Criminology	1.47
Violence and Victims	1.38
Journal of Research in Crime and Delinquency	1.09
Justice Quarterly	0.81
Natural science	
New England Journal of Medicine	21.350
Cell	20.590
Nature	19.310
Science	16.818
Nature Materials	16.166
Social science	
Quarterly Journal of Economics	11.690
Journal of Political Economies	10.740
Econometrica	8.810
Journal of Finance	7.477
Archives of General Psychiatry	6.070

Although there are many definitions and interpretations of replication, for this study the approach to identifying replication studies was based on the work of Fuess (1996): rather than classifying studies *ex post*, meaning that the articles were reviewed and classified according to established criteria, studies were categorized *a priori* (as identified by the original authors) in order to better address the authors' research questions and intent. Thus, the abstract, introduction, methods section, and conclusion sections of each article were reviewed to determine whether the author(s) described the study as a re-analysis of earlier work that did not make major changes to the measurement or analysis used in the original study.

Using this definition, studies were placed into one of two categories: original work or replication. For a study to be classified in the 'replication' category, the author(s) must have referred to at least one previous research study and presented their research as repeating the methods of the earlier study, although we allowed for very minor changes to the measurement or analysis. We also counted as replications studies in which extensions to theory or measurement were also made, so long as the author(s) first conducted a replication of earlier work and presented this as a component of the study. Within the category of replication, there are two divisions: direct replication and empirical generalization. Direct replications use the same methods and measurements on the same population to determine the internal validity of the study being replicated. Empirical generalizations use the same methods and measurements on a different population to determine the generalizability of original findings.

Table 2. Replications published across disciplines.

	Criminology	Social science	Natural science
Direct replication	6 (0.87%)	18 (1.15%)	53 (0.80%)
Empirical generalization	10 (1.45%)	26 (1.67%)	41 (0.62%)
Original research	675 (97.68%)	1515 (97.18%)	6543 (98.58%)

Note: Number of articles reported with percentage in parentheses.
$\chi^2 = 21.09$, $p < .001$.

Coding

Every volume published between 2006 and 2010 was reviewed and coded for the following information: number of articles in the issue, number of original articles, number of replication articles, and number of empirical generalization articles. Reviews of each article included a thorough read of the abstract, main body, and any footnotes. After jointly coding one volume of a criminology journal to ensure reliable coding procedures, we divided the set of journals to review. Additionally, we each coded randomly selected issues from each category of the other's list of journals in order to verify inter-rater reliability. Agreement between us on the coding was 100 percent. Once replications published in criminology journals had been identified, these studies were examined to determine the extent to which the findings presented were consistent with the findings of the studies that they sought to replicate. This was determined using discussion given by the authors of the replication study, allowing us to determine how authors of published replication studies presented their findings relative to the original studies.

Results

First, we examined the frequency of replication in criminology journals (see Table 2). Between 2006 and 2010, 691 articles were published in these journals. Six of these articles (0.87 percent) were categorized as direct replications, which replicate the methods of an earlier study using the same population. Another 10 (1.45 percent) were classified as empirical generalizations, which replicate the methods of an earlier study but focus on a different population. Therefore, 2.34 percent of the articles published in the top five criminology journals were some form of replication.

Next, we analyzed journals in the social and natural sciences. Replication in the broader social sciences was somewhat more common than that in criminology; 2.82 percent of the articles published in the top social science journals were categorized as replications. Out of 1559 social science articles published between 2006 and 2010, 18 (1.15 percent) were direct replications of earlier studies and 26 (1.67 percent) were empirical generalizations. As hypothesized, a smaller percentage of replication studies were published in the natural sciences (see Madden et al., 1995). Of 6637 natural science articles presenting data and research findings, 53 (0.80 percent) were direct replications and 41 (0.62 percent) were empirical generalizations. The difference across disciplines was statistically significant ($\chi^2 = 21.09$, $p < .001$).

Table 3. Support for original study found in criminology replication research.

	Direct replication	Empirical generalization
Consistent with original study	2 (33.3%)	6 (60.0%)
Partially consistent with original study	1 (16.7%)	3 (30.0%)
Not consistent with original study	3 (50.0%)	1 (10.0%)

Note: Number of studies reported with percentages in parentheses.

We then examined the findings of the 16 studies published in criminology journals that were categorized as either direct replications or empirical generalizations. Specifically, we noted whether the findings of these studies supported or contradicted the findings of the original studies (see Table 3). Although the small number of replication studies makes these results difficult to interpret, it appears that direct replications that were published in these journals tended to contradict the findings of the original study. Only 2 of the 6 direct replications reported findings consistent with the study they replicated, while the others contradicted or partially contradicted the findings of the original studies. Conversely, 6 of the 10 empirical generalizations, which replicated an earlier study but were concerned with applying the findings to a different population, were consistent with the original study, with the other 4 reporting results that were inconsistent or partially inconsistent with the original study. This is not surprising, because reviewers and editors are likely to consider these studies unique contributions to the field, since such research provides a new perspective on an existing theory or observation.

Discussion

Owing to the importance of replication of quantitative criminological work for the creation of criminal justice policy, the current study aims to provide initial insight regarding the frequency with which replications are published in criminology journals. Previous content analyses in other disciplines found replication rates of between 3 and 10 percent in prestigious journals, with most studies finding replication rates around 5 percent. Similarly, our results show that replication studies are not published frequently in the most influential criminology journals. Direct replications made up less than 1 percent of the articles published in the top criminology journals between 2006 and 2010. When including empirical generalizations, the replication rate in these criminology journals during this time period was 2.2 percent. It is important to note that criminology emerged as a separate discipline relatively recently; therefore, there may be a greater emphasis on developing and testing new theories within criminology than there is in other disciplines.

It has been suggested that replication is rare in the social sciences owing to an emphasis on originality for journal publications and universities' emphasis on publication as an indicator of scholarly productivity. For example, we found that empirical generalizations were more likely than direct replications to appear in journals in the social sciences or in criminology. A study extending previous findings to a new population may be seen as

more original than a direct replication, increasing the likelihood of publication. Relatedly, although this was not directly tested in our study, many of the social science or criminology studies categorized as direct replications also presented an extension of the earlier work, perhaps providing necessary material for publication.

Previous research shows that replication studies are more likely to be published if the findings contradict the original study, because such articles may be considered a more meaningful contribution to the literature (for example, Hubbard and Vetter, 1996; Reid et al., 1981; Wilson et al., 1973). The results of this study, although not conclusive, may provide some preliminary support for this idea. We found that direct replications tended not to provide support for the findings of the original study. However, we cannot say whether the lack of support provided by replication studies reflects a bias toward supportive replications, as suggested by previous research (Kerr et al., 1977; Neuliep and Crandall, 1990; Madden et al., 1995), or the existence of Type I errors in published research. If the latter were true, more replication research would be needed to prevent the dissemination of erroneous findings in top-tier criminology journals. Importantly, if the results of any single studies published in criminology journals were unreliable, theories based on these studies would be limited, and further research building upon their results would be misguided.

Policy implications

If replication is not being conducted, caution may be needed when attempting to create policy or programs based on the results of academic research published in top criminology journals. Because of the applied nature of criminology and criminal justice, the need for replication is greater than in some other social science fields; policies based on unreplicated and erroneous studies could potentially waste a great deal of money and even cost lives. Instead, policy and practice should be based on consistent and replicated research rather than the results of individual studies.

Single studies often receive a great deal of attention, and the public often argues that the results warrant changes to policy or practice. For example, after the Minnesota Domestic Violence study (Sherman and Berk, 1984), many police departments considered adopting policies mandating arrest for domestic violence offenders. However, the results of later replications (for example, Pate et al., 1991; Sherman et al., 1991; Berk et al., 1992; Hirschel et al., 1992; Dunford, 1992) suggest that such policy changes may not be advisable. A more recent example is Danziger, Levav, and Avnaim-Pesso's study of parole decisions (2011), in which parole was more likely to be granted by parole boards at the beginning of the work day or after a meal break; the authors concluded from this finding that decision-makers are susceptible to psychological biases. This finding initially received a great deal of attention from various media outlets despite a lack of replication, with calls for policy changes to minimize human error (see, for example, Melnick, 2011). However, it has since been argued that the patterns observed by Danziger and colleagues were erroneous, as cases seen by parole boards are not ordered randomly (Weinshall-Margel and Shapard, 2011); these questions call for further replication of the study to examine the extent to which extraneous factors influence the decisions made by judges.

If criminologists are not encouraged to produce replications of earlier work, the validity of the results of available studies (that is, those published in academic journals) is unknown. Additionally, our results suggest that there are occasions when the findings and conclusions of original studies could be challenged by conflicting findings from replication studies. To avoid the implementation of ineffective and potentially erroneous policies or practices, criminal justice professionals should conduct thorough literature reviews to find multiple evaluations of a particular program or strategy prior to facilitating organizational change. Additionally, practitioners should give particular consideration to meta-analytic findings, because these studies incorporate results of multiple previous studies.

Limitations and suggestions for future research

As with all research, there are limitations of this study that must be addressed. First, the definition of replication used in this study required that the author(s) of an article described the study as a replication of earlier work. We recognize that this definition of replication may be conservative in nature. Based on the *a priori* definition, it is likely that fewer studies were classified as replications than if they had been classified *ex post*. Another possible avenue would have been to examine replication of findings rather than entire studies (for example, Wilson et al., 1973). However, we contend that there are several advantages to our definition of replication: (a) the *a priori* classification speaks to the authors' intentions to engage in replication research; (b) if replication were directly and explicitly tied to the purpose or goal of the study, our results could speak to the preferences of editors and reviewers in accepting replication studies for publication; (c) the definition of replication employed in this paper does not require that the coders be experts in the topic of the study, allowing for a broad range of research to be included in the analysis.

Second, owing to the exploratory nature of our inquiry, our sample is limited in a few ways that reduce the generalizability of our findings. For instance, the sample includes only articles published in a five-year period. More notably, like previous research on replication in other disciplines, our sample consists only of the top journals in each discipline. It is possible that top-tier journals place more emphasis on uniqueness than lower journals, making lower journals – especially those with a stronger policy focus – a better outlet for replication studies. In addition, replication studies may also be available in government or technical reports. Therefore, replication research may be conducted and published more frequently than our findings suggest. Scholars interested in extending this topic should examine a wider range of criminology journals and other sources of scientific work. However, because it is more important for promotion and tenure for scholars to publish in prestigious journals, we contend that the absence of replications in prestigious journals decreases the willingness of scholars to engage in replication research. Also, the increased visibility of academic journals, especially top-tier journals, makes it less likely that replication research in lower journals or in government or technical reports will be widely seen. Therefore, scholars and practitioners may be aware of findings that were published in prestigious journals but unaware of failure to replicate these findings, which may hinder the development of theory or policy.

Third, because the selection of journals for the social science category may not be representative of the social sciences field, our cross-disciplinary comparison is limited. Specifically, four of the journals were economics or finance journals, in which replicability of quantitative analysis would be seen as more important than in other social science fields that are more dominated by historical or qualitative analysis. The fifth was a psychiatry journal, which also may not be representative of other social science disciplines such as sociology or political science. However, psychiatry may be more similar in content than finance or economics to the criminology journals of interest. In other words, a review of human service journals might lead to different findings in describing rates of replication publication for social sciences as well as in comparison with criminology journals.

Fourth, because we analyzed published articles rather than submitted articles, the conclusions that can be drawn from the findings of our study are limited. Although the results show that replications are unlikely to be published in criminology journals, we are unable to determine the reason for their absence. It is unclear from our analysis whether few replications are published because scholars choose not to perform replication research or whether conducted replications are stuck in researchers' file drawers (see Rosenthal, 1979) because editors choose not to publish studies that replicate earlier work without providing new contributions. Future research should attempt to determine the extent to which publication biases exist in criminology, and how any such biases relate to the publication of replication studies. One such approach would be to seek out the assistance of top-tier journal editors in obtaining all manuscripts submitted for review and analyze the proportion of submitted manuscripts that contain replications of earlier work.

Finally, another direction for future research is to examine the ways that solicitations for funding encourage or discourage replication studies. We suspect that existing grant funding is generally awarded to scholars proposing new research, unless they are conducting replications in controversial areas. Because external funding for research is as important for hiring, promotion, and tenure as publication, a bias against replication in this arena could further discourage scholars from replicating existing work.

Developing a replication tradition in criminology

Our results, although limited, suggest that it is possible that scholars in the field of criminology may need encouragement to engage in replication research. There are several practical steps that could be taken to promote the use of replication of applicable studies in criminology. First, grant solicitations and calls for research could specifically target replication research; these could be supported by special foundations or specific solicitations by grant-awarding bodies (see Mayer, 1980). This type of monetary support would encourage replication research not only by providing opportunity and funds for the study, but also by rewarding scholars for their conducting replications with a stronger potential for tenure and promotion for securing funding for their work. As an extension of this recommendation, funding sources could also either require internal replication as a condition of the reward or require that authors submit and release the data to the funding sources for others to reanalyze.

Second, the editorial policies of top journals could be modified to facilitate more replications. Criminology journals could require or encourage authors to maintain their raw data and descriptions of their procedures to provide scholars interested in replicating their studies with the necessary information to do so (see Hubbard and Armstrong, 1994). In addition, criminology journals could feature web blogs for each article where authors could post the results of replications of each study, increasing the visibility of replication research. Editors of top-tier criminology journals could also organize special issues for replication studies or issue calls for papers that replicate existing work (for example, Madden et al., 1995). Alternatively, as scholars in other disciplines have recommended (see Hubbard and Armstrong, 1994; Hubbard and Vetter, 1996), replication research could be encouraged through journals dedicated to the publication of replication studies, and/or a special section within existing journals in which a small number of replication studies could be featured. Hubbard and Armstrong (1994) suggest editorial boards appoint a separate 'replication editor' to oversee this section, ensuring that replications of important articles are published. They also suggest methods for determining which articles are 'important' and therefore should be replicated, such as identifying highly cited articles or surveying scholars and practitioners.

A third approach that could increase replication of criminology research is to incorporate replication into education. Although replication of existing studies has been implemented by professors of undergraduate research methods courses in some psychology programs (Frank and Saxe, 2012), it may be more feasible for replication research to be conducted by graduate students. An incorporation of replication research into graduate education would not only increase the number of replication studies conducted but also provide beneficial research experience to students in criminology programs and increase their scholarly ability and productivity. As suggested by Reid et al. (1981), graduate students could be encouraged to conduct replications of published work for their dissertations or other research. Additionally, replication could be a mandatory part of graduate education; for example, graduate students in some econometrics and marketing programs are required to replicate and extend a published empirical study as a class or degree requirement (Dewald et al., 1986; Hubbard et al., 1992; Feigenbaum and Levy, 1993). As discussed above, there is a perception among scholars that replication research is not rewarding. A requirement in graduate school to conduct replications of earlier work would increase the replication of criminology studies in spite of the lack of popularity of such research. Whether required or optional, replication research conducted by graduate students should be made public; for example, unpublished replications could be available on the program's website and data could be submitted to data-housing organizations such as the Inter-university Consortium for Political and Social Research.

If further inquiry into the replication of quantitative criminology research demonstrates a need to increase the use of replication in criminology, we recommend a combination of explicit encouragement of replication studies in criminology journals and incorporation of replication into criminology education. We feel that an emphasis on replication during one's scholarly training, along with incentives associated with an increased ability to publish replication research, may improve the perception of replication research among criminologists, thereby further increasing replication of applicable findings in criminology.

Authors' note

An earlier version of this paper was presented at the 2013 Academy of Criminal Justice Sciences Annual Meeting in Dallas, TX. We would like to thank Francis T. Cullen and John H. Kramer for their helpful comments on earlier drafts of the paper.

Funding

The research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Note

1. Because of the use of citation indices, which privilege journals located in areas with larger numbers of researchers, the sample – especially in regards to criminology – is primarily made up of US journals in which a majority of articles are authored by US scholars. Therefore, our results may not be representative of research conducted by scholars of different nationalities or the publication practices of prestigious journals housed in other countries.

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