

**What Have We Learned from Offender Profiling?
A Systematic Review and Meta-Analysis
of 40 Years of Research**

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Abstract:

In the 4 decades since offender profiling (OP) was established, hundreds of journal articles, books, book chapters, reports, and magazine articles have been published on the topic, and the technique has been used by countless law enforcement agencies around the globe. However, despite the popularity and extensive literature published on OP, very little is known about its evolution, current state, or findings of the field to date. Therefore, this study presents a systematic review and meta-analysis of 426 publications on OP from 1976 through 2016. Results of this systematic review suggest that there have been considerable improvements in the scientific rigor and self-assessment being conducted in the discipline, although in total, few studies have used a strong empirical approach to develop new profiles. Even fewer evaluations of the effectiveness of OP have been conducted. The first summary of offender profiles proposed for major crimes in OP literature is also presented, with results indicating some recurrent themes in profiles, but wide variations in the number, name, and description of the profiles often found. A meta-analysis of case linkage analysis research indicates that this area is statistically sophisticated, and has yielded moderate to strong accuracy rates for linking crimes to a single offender. Finally, the first analysis of the most prolific authors, researchers, departments, and outlets for OP research, and the methods, approach, and most cited publications in OP are identified. Suggestions for future research on OP and the potential impact that this may have on policy and practice are also discussed.

Public Significance Statement:

This systematic review and meta-analysis indicates that the field of offender profiling has made considerable improvement in the scientific rigor of its research, with case linkage analysis studies showing moderate to strong accuracy in its ability to link crimes to a single offender. Although recurring themes in profiles can be found in the meta-analysis of offender profiling research, there is also considerable variability in the number, name, and description of the profiles. Despite being applied often in active police investigations, very few evaluations of the profiles' accuracy or effectiveness have taken place. This lack of scientific evidence on the validity and impact of profiling, despite the technique's widespread use, seriously questions its efficacy in real world investigations, as it currently stands.

Keywords: offender profiling, case linkage analysis, systematic review, meta-analysis

What Have We Learned from Offender Profiling? A Systematic Review and Meta-Analysis of 40 Years of Research

The basic idea of profiling is very simple. Its aim is to predict characteristics of the undetected offender(s) from characteristics of the offense(s) and the victims(s).

However, this simple aim leads to many complex and unanswered questions.

-David Farrington (2007, p. 486)

Offender profiling (OP) is an investigative tool used primarily by law enforcement, psychologists, academics, and consultants to help identify the major personality, behavioral, and demographic characteristics of an offender based upon an analysis of the crime scene behaviors (Douglas & Burgess, 1986; Fox & Farrington, 2015; Ormerod, 1996a). This tool can be used to generate or narrow down the range of possible suspects based upon the established links between the type of crime committed, and the characteristics of offenders who commit those types of crimes. Although the basic concept of OP is straightforward, determining the numerous backgrounds, methods, terminology, and findings in the field has been anything but clear.¹

In the first article on OP, published by Colin Campbell in *Psychology Today* in 1976, researchers were called upon to prove that profilers are “better than bartenders” at predicting traits and features of offenders. Despite the considerable research conducted on OP, and extraordinary popularity of the technique among law enforcement, it is still unclear where the field currently stands from a scientific standpoint, particularly in terms of Campbell’s (1976) legendary “bartender” test.

Specifically, in the four decades since the establishment of the OP field, there have been hundreds of journal articles, books, book chapters, reports, and magazine articles published on the topic (Dowden, Bennell, & Bloomfield, 2007). However, there appears to be substantial variation in what is considered to be OP, who is conducting it, the methodology and approach that is used, the findings that are achieved, as well as where and how the results are presented. Therefore, despite the popularity and extensive literature on OP, very little is known about the current state or findings of the field to date.

Conducting a systematic and scientific evaluation of the field of OP is vital for two reasons. First, OP is not only extremely popular in the media and pop culture, it is also a popular area of research for scholars in psychology, criminology, and beyond. Unfortunately, there is very little within the field of OP that is well-established and agreed upon, which is perhaps due to the lack of uniformity in methods, data, or even the basic terminology used by those conducting research on OP (Bosco, Zappala, & Santtila, 2010; Ebisike, 2008; Fox & Farrington, 2015; Wilson, Lincoln, & Kocsis, 1997). For instance, some use a clinical approach to OP, where profiles are developed on a case-by-case basis by a profiler who has considerable training, experience, and practice in the field, but with no clear process or methodology outlined (e.g., Holmes & Holmes, 1996; Snook, Cullen, Bennell, Taylor, & Gendreau, 2008). Conversely, others conduct and have begun to evaluate OP using objective and replicable measures and

¹ It is important to note that (1) there is not a single agreed upon definition for offender profiling used by all in the field, and (2) there are other related (and arguably synonymous) terms/concepts, including criminal profiling, criminal investigative analysis, and personality profiling, which are also used in the field based solely upon author preference and background, not substantive differences in terminology or meaning.

scientific methods in subfields such as investigative psychology (Canter, 1995a; Canter, 2011), case linkage analysis (Bennell & Canter, 2002; Bennell, Mugford, Ellingwood, & Woodhams, 2014), and evidence-based profiling (Farrington & Lambert, 2000; Fox & Farrington, 2012, 2015).

Although a more statistical approach to OP is beginning to be adopted, there is no synthesis of the numerous methodologies, terminology, and recurring findings from research within OP. This synthesis appears to be essential in a field that has such substantial practical implications, and is aiming to become a true scientific practice (Farrington & Lambert, 2000). Therefore, systematically and scientifically identifying, analyzing, and summarizing the extant body of research is critical to the advancement of the OP field.

The second key issue stems from the fact that OP is inherently an applied discipline, as the findings are routinely used in active investigations by law enforcement around the globe (Homant & Kennedy, 1998; Snook, Eastwood, Gendreau, Goggin, & Cullen, 2007). However, there is currently no standardization in the profiling techniques or even awareness of the recurring offender profiles in existence. There are also very few evaluations on the effectiveness of the multitude of methodologies and profiles that are being implemented by law enforcement in unsolved cases. The primary concern is that, although OP is utilized regularly in police investigations, the field currently does not rise to the level of scientific credibility according to the 1993 Daubert standard (see Bosco et al., 2010; Ebisike, 2008; Fox & Farrington, 2015; Pakkanen, Bosco, & Santtila, 2014; Turvey & Freeman, 2012). Specifically, there is no known reliability or error rate for the vast number of methodologies or profiles developed in the field, largely because it is unclear what methodologies and resultant profiles currently exist. Additionally, it is unknown what proportion of the profiles used in practice have undergone the peer review process and if that proportion is changing over time. Without this information, general acceptance of OP in the psychological field is unlikely to be achieved. Although there is great hope in OP, there are many questions that need to be answered for it to become a more credible and scientific field.

Prior Reviews and Meta-Analyses of OP

Three systematic reviews and meta-analyses have been conducted in the field of OP (Bennell et al., 2013; Dowden et al., 2007; Snook et al., 2007). The latter two, conducted about a decade ago, noted that in the OP field “there has been very little synthesis of the research to date to identify how things have developed, if at all” (Dowden et al., 2007, pp. 44–45) and that there is an “absence of well-defined profiling framework and cumulated empirical knowledge” (Snook et al., 2007, p. 437) in OP. Therefore, these studies aimed to conduct a synthesis of the literature to provide a clear indication of the status of the field, and the methodologies, scholars, and findings on which the practice of OP is based. A major goal of this study is to replicate and expand upon prior work by Dowden et al. (2007), Snook et al. (2007), and Bennell et al. (2013).

Dowden et al. (2007): Review of OP Journal Articles

The review conducted by Dowden et al. (2007) used a content analysis of published journal articles on OP to conduct a “preliminary quantitative synthesis” of the available literature

from 1976 to 2007 (p. 45). A total of 132 published articles were identified for inclusion through searches of electronic databases for the following terms: profiling, homicide, serial killing, and criminal investigative analysis. All books, book chapters, and published reports were excluded from analysis. Additionally, articles on related fields such as geographic profiling and case linkage analysis were removed from the study.

The results of Dowden and colleagues' (2007) review showed that the number of articles on OP increased substantially over time, with over 61% of the articles published between 1995 and 2007. The proportion of studies that underwent peer review also showed a significant increase during that time frame, in addition to a significant change in statistical sophistication of the studies over time. Nearly four times as many studies used inferential statistics between 1995 and 2006, as compared with those published before 1995. Each article was also coded on the basis of its "emphasis," with discussion pieces being most prevalent. Also, although most studies discussed profiling in general (41%), the most common crime type profiled was homicide (30%). Finally, with respect to the authors of OP research, most (34%) were psychologists, whereas 7% were FBI agents, 5% were criminologists, 3% were forensic psychologists, and the remainder were in other professions. Only 18 authors had published three or more articles on OP by 2007.

Snook and Colleagues (2007): Review of OP Publications and Analysis of Profiler Accuracy

The study by Snook and colleagues (2007) was unique in that it included a narrative review of all peer reviewed publications on OP up to 2007. A total of 130 publications were identified in database searches using the keywords criminal profiling, psychological profiling, and offender profiling. Snook et al.'s review focused on the processes used to develop profiles, with results indicating that 60% of publications used anecdotal inferences to develop profiles, 42% were based on some scientific evidence, and 23% used intuition as a data source in the publications.² However, statistically oriented articles were published significantly more often after 2000 as compared with before, tended to be written by authors outside the United States, and were conducted by academics versus law enforcement or FBI agents.

The "meta-analysis" of profiler accuracy was based upon four studies that evaluated the accuracy of self-labeled profilers as compared with other groups (e.g., psychologists, police officers, college students, psychics). No effect sizes or other meta-analytic data were collected or reported. It was found that profilers were generally more accurate than the comparison groups when predicting physical features, cognitive processes, and the social history of offenders on the basis of crime scene behaviors. When predicting the overall offender from a lineup, the profilers' accuracy rate was 62%, as compared with 38% for the nonprofiler groups. Snook and colleagues concluded that, whereas the field appears to be undergoing a scientific transformation, and profilers may be more accurate than nonprofilers, OP may not yet rise to the level of "science," at least as it stood in 2007.

Bennell and Colleagues (2013): Analysis of Research on Case Linkage Analysis (CLA)

The final review was conducted by Bennell et al. (2013) on a subset of research in OP known as CLA. CLA, which was first conducted by Bennell and Canter (2002), assesses the

² The methods used in OP publications are not mutually exclusive and do not add to 100%.

ability to statistically link crimes to a single offender on the basis of various crime scene behaviors and evaluates the accuracy of the linking decision made. Typically, CLA researchers use receiver operating characteristic (ROC) analysis to evaluate behavioral similarity across offenses, and determine the likelihood of case linkage (Bennell et al., 2013). The follow-up draws upon area under the ROC curve (AUC) analysis, a technique commonly used in the psychological and medical fields to make two-alternative diagnostic decisions (e.g., cancer vs. noncancer), to determine the level of accuracy when linking crimes to a serial offender (Bennell et al., 2013; Steadman et al., 2000). Given the statistical sophistication of CLA, and the applied uses in criminal investigations, CLA appears to be a rapidly growing subset of OP research.

Bennell and colleagues (2013) conducted a descriptive analysis of all available CLA research from 2002 through January 2013. A total of 17 published articles were identified through electronic database searches for case or crime linkage analysis. The results indicated that there was considerable variability in AUCs across all CLA studies, with some AUCs as low as .45, which indicates an accuracy below chance, whereas others were as high as .96, indicating near perfect accuracy in linking decisions. Overall, about half of the reported AUCs fell into the moderate accuracy range (.70 to .89), whereas 14% were considered highly accurate (over .90), 36% indicated low accuracy (.50 to .69), and 1% were below chance. Burglary and sexual assault were the most common crime types in the CLA studies, although AUC values were the highest for homicide, followed by sexual assault, arson, burglary, and then robbery and car theft. Average AUCs for each offense type were not provided.

With respect to linking accuracy by nation in which the data were collected, considerable variability in AUCs by country were reported, with Finland showing the highest average AUC (.72). AUCs for all other countries were not reported. Finally, the behavioral domains used to make the linking decision were also evaluated. Bennell and colleagues (2013) reported that intercrime distance resulted in some of the most accurate linking decisions, whereas modus operandi (MO; i.e., behaviors that indicate offenders' method when committing a crime) produced lower average AUCs (the specific values were not reported). Bennell et al. concluded by stating that, whereas the field of CLA has substantial potential, and the overall accuracy found for certain crimes and behavioral domains could lead to effective crime-solving strategies when applied in police investigations, more research was clearly needed on the topic (see also Ebisike, 2008; Fox & Farrington, 2015; Pakkanen et al., 2014; Turvey & Freeman, 2012).

Current Aim

Although the three aforementioned studies paved the way for this research in terms of a better understanding of the variety of approaches, data, methodologies, researchers, and ultimately, findings in the field of OP, the current study aims to replicate and build on these past analyses in four ways. First, this study collected and analyzed an additional decade of publications, as the previous systematic reviews of OP literature were conducted by Dowden et al. (2007) and Snook et al. (2007) over 10 years ago.

Second, a broader array of publications on OP are drawn upon, so a thorough evaluation of all forms of literature on the topic (to include peer reviewed journal articles, books, and book chapters, as well as non-peer reviewed publications including nonacademic books, reports, and

trade journal articles, which were excluded from prior reviews) as well as the methods, findings, outlets, citations, and authors who produced these works. An emphasis is placed on the overall prevalence and changes over time in the methods, statistical sophistication, peer review, author types, affiliations and departments, and assessment of impact of OP publications.

Third, to benefit the readers of this article and provide a comprehensive view on the state of the field of OP, two additional analyses were conducted. A systematic review was conducted to identify the recurring profiles proposed for each crime type (no effect sizes are available). As a field it is essential that we take stock of what profiles are being developed, how, and if certain offender types are consistently linked to certain offending behaviors. No such summary of extant profiles currently exists in any form.

Finally, a meta-analysis of CLA research is also conducted, in order to determine the average accuracy of CLA, a rapidly growing field within OP, as well as how this accuracy rate specifically varies according to the type of crime, behavioral domain, and location of the offense data of interest. This builds upon prior research, and provides the first meta-analysis on the active and growing subfield of CLA.

This comprehensive and holistic approach allows for a more accurate and complete assessment of the unique methodologies, findings, and when available, effect sizes, within OP, and provides a “state of the art” analysis of the field. (To date, no other study has evaluated the state of OP in this manner.) Additionally, to have a true assessment of where we are, it is important to evaluate where we came from. Older OP literature (particularly the work developed by FBI profilers in the 1970s and 1980s) still impacts police and public perception of the field of OP. Omitting this literature from an analysis of OP, particularly when it has played such an important (albeit controversial) role in the field’s history, only serves to ignore it, not evaluate it. The ultimate goal of this study is to evaluate the current state of OP, its evolution, and the cumulative impact of 4 decades of work in order to benefit the researchers and practitioners who study and use OP around the world.

Method

Data

This study aimed to identify and collect all available publications on OP, including peer reviewed journal articles, books, book chapters, magazine articles, research reports, and trade journal articles published from 1976 through 2016. To do this, an electronic search of psychological, criminological, and medical journal databases including PsycINFO, PubMed, Criminal Justice Abstracts, Medline, Web of Science, and the National Criminal Justice Reference System was conducted to identify suitable publications to be included in this study. Additional searches were conducted using Google Scholar, Thomson Reuters Institute for Scientific Information, and the lead author’s university international library catalog to help identify books, book chapters, trade journals, and other types of publications not included in academic journal databases.

Selection Criteria

As noted, OP has been defined in multiple ways by various authors, based largely on

their preference and background (Ebisike, 2008). Furthermore, OP is also referred to by various names, including *criminal profiling*, *psychological profiling*, *criminal investigative analysis*, *crime scene analysis*, *behavioral profiling*, *personality profiling*, *case linkage analysis*, *behavioral consistency analysis*. Consequently, each database was searched using the following key words: *offender profiling*, *criminal profiling*, *psychological profiling*, *criminal personality profiling*, *personality profiling*, *criminal investigative analysis*, *investigative psychology*, *behavioral profiling*, *behavioral evidence analysis*, and *geographic profiling*. Additional keywords were *case linkage analysis*, *crime linkage*, *crime linkage analysis*, *crime scene analysis*, *behavioral linkage*, *behavior linkage*, *crime behavior consistency*, and *behavioral consistency analysis*.³ The search period was January 1, 1976 to December 31, 2016. To supplement these database searches, the reference lists of prior systematic reviews as well as all publications identified through the search were examined to identify additional relevant works.

Publications were included in the study if they provided (1) a general, legal, or theoretical discussion of OP (or any of the aforementioned keyword variants used in the search string); (2) a case study applying OP; (3) proposed or developed a profile; (4) performed case linkage analysis (or any of the keyword variants, as identified in the search string); (5) compared profiling methods; or (6) conducted an evaluation of a profiling technique. All identified publications were scanned to ensure that they met the inclusion criteria and were not mistakenly identified. For instance, articles that developed profiles of “lymphokine activities” and “electron density” were eliminated, so only publications relating profiling to criminal behavior were included.

In total, 513 publications met the initial inclusion criteria for the present study. However, as geographic profiling (GP) appeared to be dissimilar for direct comparison to traditional OP because of the mathematical versus behavioral/psychological-based theory and measures, distinctive GP analytical techniques (e.g., unique algorithms and computer software), and the case-specific (vs. generalizable) application of the findings, all GP publications ($n = 87$) were removed from the study. This left a total of 426 publications included in the study.

It should be noted that in addition to general analysis of the full population of OP publications, two distinct analyses were conducted using a subset of the 426 publications: (1) a meta-analysis of all publications which developed offender profiles and (2) a meta-analysis of studies on CLA’s ability to successfully link cases based upon various crime scene behaviors. To be included in the meta-analysis of existent profiles, a publication must provide sufficient information on the number and type of profiles that were developed for a specific crime (e.g., not a general discussion of profiling or a case study). A total of 62 of the 426 publications fit the inclusion criteria for the existent profiles analysis. Publications were excluded from the CLA meta-analysis if they lacked adequate statistics on the effect size and estimates of variance regarding the ability to successfully link cases based upon various crime scene behaviors. A total of 18 studies (yielding 34 total effect sizes) fit the inclusion criteria for the CLA meta-analysis.

Measures

All 426 publications were coded for the following measures: (a) year of publication, (b)

³All variations for each key word (such as *profile*, *profiles*, *profiler*, *linking*, *linkage*, *behavior*, *behavioral*) were used. Example of a search string: [offender] AND [profiling OR profiler OR profiles OR profiler].

type and (c) topic of publication, (d) author(s) names, (e) position, and (f) department/agency, (g) outlet name, (h) peer review status, (i) data collection location, (j) sample size, (k) sampling technique, (l) crime type, (m) use of statistics, (n) variables used in analysis, (o) results of study, and (p) number of citations. Most of this information was clearly and readily available, but to ensure consistency in coding across the large population of studies, we developed and used a standardized codebook for data collection. To increase comparability with prior review findings, the coding scheme(s) and measures used by Bennell et al. (2013), Dowden et al. (2007), and Snook et al. (2007) studies were used when possible.

The year of publication was coded according to the year each publication was made available to the public. *Publication type* refers to outlet of publication and coded into six categories, which are largely based on the “publication emphasis” measure in Dowden et al.’s (2007) review of OP literature. These categories include the following: peer reviewed journal article, book, book chapter, trade journal, report, or magazine article. In concordance with Dowden et al.’s (2007) description, general discussion pieces aim to explain OP, such as how it is conducted, a description of various profiles, or how OP is generally applied. Legal/theoretical publications focus on the theoretical underpinnings of OP, such as the assumptions required to evaluate behavioral consistency or to profile offenders, the implications of using OP such as the admissibility of profiling in court, or the “Daubert status” of expert witnesses in the OP field. Autobiographies, typically written by OP practitioners, describe personal experiences and cases relating to OP, whereas case studies typically develop or apply profiles, but do so to a very small sample of cases (typically fewer than five), and generally do not conduct any statistical analysis. CLA articles are empirical studies which aim to statistically evaluate the ability to accurately match multiple offenses to a single offender, and/or evaluate the consistency of behaviors in a serial offender’s crime series over time. Profile development articles aim to create a “profile” of offenders or offenses, but can range from using nonstatistical information to advanced scientific methodologies. Comparison of methods articles compare results and accuracy of different approaches to profiling, or compare the abilities of profilers with different groups of individuals. Finally, evaluations aim to assess the accuracy and/or utility of profiling.

Author affiliation refers to the self-identified professional affiliation of all authors (based on general field of employment or self-described title) included in the study. The potential responses include psychologist, criminologist, forensic psychologist/psychiatrist (in independent practice), FBI Special Agent, law enforcement/government, student, or another field. To expand on past work (but maintain a manageable amount of data), the name and affiliation for the first three authors of each publication were coded for analysis, as this represented the author(s) with the greatest contribution to each publication. The specific department/agency in which each author was employed at the time of publication was coded on the basis of information provided in each publication or a review of the author’s curriculum vitae for the time of the publication.

The name of each *outlet for publication* (e.g., journal, book, magazine) was recorded, as well as the *peer review status* (peer reviewed vs. not peer reviewed). All publications were evaluated on the basis of the *location* at which data were collected and coded into seven categories: United States, United Kingdom, Canada, Australia, and the Netherlands, “no location” (i.e., if the publication did not use data from a specific location or discussed profiling

in general), and “other” (i.e., if the study sample was derived from another geographic location or from multiple countries). The *size of the sample* was also collected. For quality evaluations, samples were dichotomized to indicate either fewer than 400 cases or 400 or more cases (Murray, Farrington, & Eisner, 2009). The sampling technique was also coded for the quality evaluations, reflecting the use of a convenience or nonprobability sampling strategy, or population or probability/random sample. Each publication was assigned to one of eight categories for the *type of crime* that was profiled: homicide (all forms), sexual assault, arson, burglary, robbery, pedophilia, no specific offense (general/multiple offenses), or some other type of offense.

Each article was classified into one of three categories on the basis of the analysis used and its *statistical sophistication*. Although we accept that the choice of appropriate statistics (or no statistics) depends on the questions being addressed, we nevertheless thought that it would be useful and informative to document the extent to which statistical methods have been used in OP research in different time periods. The categories were the use of: no statistics, basic descriptive statistics, and more advanced statistical methods (e.g., inferential statistics such as regressions, cluster analysis, latent class analysis, multidimensional scaling, and ROC analysis). The latter examples represent advanced scientific work, whereas descriptive studies (or publications based upon intuition and guesswork of profilers) are not scientifically advanced. In addition to evaluating descriptive trends in OP research, a meta-analysis of empirical OP and CLA research is also conducted. To do this, we also coded available results from publications including number and types of profiles developed and number of variables used to develop the profiles (one to five or six or more), effect sizes, and estimates of variance.

Citations for all publications in the dataset were determined using Google Scholar and were collected on January 8, 2017. To standardize citation counts for publications produced across 4 decades, the number of citations for each publication was divided by the number of years since the article was published.⁴ For instance, if an article published in 1986 generated 300 citations by 2016, the standardized impact score would be 10. The operationalization of all measures in an official codebook is available on request.

Results

Overview of OP Publications From 1976 to 2016

A total of 426 OP publications were included in the present review and meta-analysis. To measure the quality of included studies, a risk of bias evaluation was conducted. The descriptive statistics for each variable in this analysis are presented in Table 1. All publications included in this study are on the reference list, preceded by an asterisk. As traditional methodological quality criteria do not apply to most OP publications (see Farrington, 2003), we developed a series of measures to evaluate study quality on the basis of items included in the Cochrane Effective Practice and Organization of Care (Cochrane Effective Practice and Organization of Care

⁴ In an analysis of top 15 highest impact publications based upon total (unstandardized) citation count, nine were also on the top 15 highest impact publication list using the standardized citation count. Interestingly, all items on the unstandardized list were books or autobiographies, and all but one (93%) were published prior to 2000.

Review Group, 2017) and Cambridge Quality Checklists (Murray et al., 2009).

Table 1
Descriptive Statistics on Offender Profiling Publications

Study variables	Frequency	Percentage
Publication decade		
1976–1985	19	4.5
1986–1995	59	13.8
1996–2005	150	35.2
2006–2016	198	46.5
Publication topic		
General discussion of profiling	134	31.4
Legal/theoretical discussion	22	5.2
Autobiography	14	3.3
Case study	20	4.7
Case linkage analysis	39	9.1
Profile development	135	31.7
Comparison of methods	22	5.2
Evaluation	40	9.4
Author affiliation		
Psychologist	364	42.7
Criminologist	145	17.0
Forensic psychologist (private practice)	51	6.0
FBI special agent	56	6.6
Law enforcement/government	84	9.8
Student	50	5.9
Other	102	12.0
Peer review		
Not peer reviewed	157	36.9
Peer reviewed	269	63.1
Publication type		
Peer reviewed journal article	269	63.1
Book chapter	68	16.0
Book	35	8.2
Trade journal	31	7.3
Report	6	1.4
Magazine article	17	4.0

The resulting methodological quality evaluation contained five indicators: (1) sample size, (2) peer review, (3) sampling technique, (4) number of variables used in the analysis, and (5) statistical technique used. A total methodological quality score ranging from 1 to 10 was also calculated by totaling a score on all quality indicators.⁵

In total, half of all publications did not use a sample, 43% drew upon a sample less than 400 ($n = 184$), and 7% used a sample of 400 or greater ($n = 29$). The results indicated that nearly two thirds of publications went through a blinded peer review process ($n = 269$), whereas one third of publications did not ($n = 157$). Although 57% of the publications did not report or did not use a sampling strategy, nearly a quarter used a convenience or nonprobability sample ($n =$

⁵ The methodological quality evaluation comprising five items, scored as sample size (0= not applicable, 1= 0–399, 2= 400+), peer review (1= not peer reviewed, 2= peer reviewed), sampling (0= not reported or applicable, 1= convenience or non probability sample, 2= population or probability/random sample), number of variables (0= none, 1= 1–5 variables, 2= 6+ variables), statistical technique (0= none, 1= descriptives, 2= advanced/inferential statistics). The methodological quality scale ranged from a potential total score of 1 to 10.

102), and 19% drew on a population, probability sample, or random sampling technique ($n = 81$). In terms of the number of variables or control measures used in these publications, slightly over half did not use any variables ($n = 222$), 14% used one to five variables ($n = 61$), and 34% used six or more variables in the analyses ($n = 143$). Finally, of the 426 texts published on OP to date, over half used no statistics of any kind ($n = 218$). About 22% used descriptive statistics ($n = 95$), and 26% used more advanced statistical analysis in the profiling methodology ($n = 113$). The full sample of 426 studies yielded a mean total quality score of 4.38 ($SD = 3.11$) out of 10.

A large proportion (47%) of OP publications were produced in the last decade (2006 to 2016), and an upward trend in OP publications can be seen over time. Between 1976 and 1985 an average of less than two publications per year were produced on OP ($n = 19$), whereas nearly 20 publications on OP per year were produced between 2006 and 2016 ($n = 198$). In short, the rate and number of OP publications per decade has dramatically increased since 1976, particularly in the last 10 years.

In the last four decades, most publications have fallen into the profile development (32%; $n = 135$) or general discussion of profiling categories (31%; $n = 134$). The remaining areas have considerably fewer publications, with 9% of studies in the CLA ($n = 39$) and profile evaluation categories ($n = 40$), and 5% were classified as legal/theoretical articles ($n = 22$), comparison of method publications ($n = 22$), or case studies ($n = 20$). Approximately 3% of the publications are profiler autobiographies ($n = 14$).

When the self-identified professional affiliation of all authors (on the basis of department of employment or self-described title) in the analysis were evaluated ($n = 852$), the plurality (43%; $n = 364$) of authors identified as psychologists, whereas 17% identified as criminologists ($n = 145$). A total of 10% were law enforcement or government officials ($n = 84$), and less than 7% of all authors were a FBI Special Agent or profiler in the FBI's Behavioral Science Unit (BSU; $n = 56$). Only 6% of authors identified as a forensic psychologist or psychiatrist in independent practice ($n = 51$), and 6% of the authors were graduate students ($n = 50$). A total of 12% of authors identified in a position not covered by the traditional affiliations coded for this analysis ($n = 102$), such as mathematicians and statisticians, epidemiologists, journalists, and so on.

When evaluating the types of author(s) who have published on profiling over time, there are several considerable changes. First, although FBI Special Agent profilers made up nearly half (45%; $n = 13$) of those who published on OP between 1976 and 1985, this decreased substantially each subsequent decade, down to 28% between 1986 and 1995 ($n = 29$), 5% between 1996 and 2005 ($n = 14$), and finally down to zero between 2006 and 2016. Authors in other law enforcement agencies wrote 24% of all publications between 1976 and 1985 ($n = 7$), but they were responsible for less than half that proportion (9%) by 2006 to 2016 ($n = 40$). The largest increase in OP publications occurred among psychologists, as this group authored just 5 of the articles published between 1976 and 1985, but this rose to 122 articles between 1996 and 2005, and nearly 200 between 2006 and 2016 (46%). The number of articles written by criminologists and graduate students also increased considerably, with criminologists initially authoring just 2 articles published between 1976 and 1985 (7%), but the rate increased over

300% as criminologists authored 90 OP publications between 2006 and 2016 (21%). Although graduate students wrote no articles on OP between 1976 and 1985, they authored 38 (9%) of the publications between 2006 and 2016. The remaining two author groups (forensic psychologists and all other positions) stayed relatively stable in their proportion of authorship over time. Overall, the relationship between author position and decade is statistically significant, suggesting that the changes in the types of people writing articles on OP differs significantly compared with what is expected by chance, $\chi^2(18) = 217.53, p < .0001$.

The peer review status of each publication was also coded to determine the proportion of publications that undergo this important evaluation process, and whether this has changed significantly over time. Although peer review was far less common between 1976 and 1985 (peer reviewed $n = 3$; non-peer reviewed $n = 16$), by 1996 to 2005 peer reviewed publications outnumbered non-peer reviewed publications ($n = 93$ vs. 55, respectively). Between 2006 and 2016, the number of peer reviewed publications increased considerably to 147 whereas the number of non-peer reviewed publications decreased to 51. The relationship between peer review status and decade of publication is statistically significant, $\chi^2(3) = 41.59, p < .0001$.

With respect to the type of each OP publication, the majority (63%) were peer reviewed journal articles ($n = 269$), whereas 7% were articles in trade journals such as the *FBI Law Enforcement Bulletin* and *Police Chief* ($n = 31$). Book chapters are the second most common form of publication on OP ($n = 68$; 16%), followed by books ($n = 35$; 8%), and finally magazine articles ($n = 17$; 4%) and reports ($n = 6$; 1%). The type of crime profiled in each of the 426 publications was also examined. The results indicate that, although many articles did not focus on a single specific crime (42%; $n = 177$), the most common offense studied was homicide (26%; $n = 113$). Sexual assault was the second most common offense (13%; $n = 57$), followed by all other offense types, which included fraud, terrorism, and cybercrime (8%; $n = 33$). Five percent of profiling publications were conducted on burglary ($n = 22$), and arson comprised 3% of the total publications ($n = 13$). Robbery ($n = 7$) and pedophilia ($n = 4$) were the least common offenses profiled, at 2% or less of all publications.

The geographical locations of the crimes/offenders analyzed in each publication were evaluated. Although one third of the publications did not have a specific geographic location ($n = 143$), one quarter of all offender and crime data in profiling studies was collected in the United States (25%; $n = 107$). About 17% of publications are based on data from the United Kingdom ($n = 74$), whereas 8% are from Canada ($n = 33$), 4% are from Australia ($n = 15$), and 1% are from the Netherlands ($n = 6$). Approximately 11% are from other nations ($n = 48$) such as France, Spain, Sweden, Finland, Belgium, Germany, Italy, Turkey, Japan, Egypt, Israel, Cyprus, and China (max “other” country $n = 4$).

The use of statistics in each publication was also evaluated. With respect to changes in the use of statistics in OP publications over time, a statistically significant association was found, $\chi^2(6) = 36.42, p < .0001$. Specifically, whereas 68% of publications between 1976 and 1985 used no statistical analysis ($n = 13$), the remaining 32% of publications in that decade used only basic descriptive statistics ($n = 6$). However, in the last decade (2006–2016), the proportion of publications using no statistical analyses dropped to 40% ($n = 80$), and the use of more advanced

statistical methods rose to 33% ($n = 66$). Although just a third of the recent OP publications using advanced statistics seems low, this is a considerable increase from zero publications three decades earlier.

Most Prolific Authors and Cited Publications in OP From 1976 to 2016

Table 2 presents the 25 most prolific authors who published on OP from 1976 to 2016. This analysis indicates those who are the most prolific in overall authorship, the most prolific lead authors, and most prolific lead authors on just peer reviewed journal publications. While prolificacy does not necessarily equate to quality of publications, prolific authors may have more influence on the field, as his or her ideas and findings are being disseminated at a higher rate than others (and if peer reviewed, indicate support by his or her peers in the field).

Table 2

Most Prolific Authors in Offender Profiling Since 1976

Rank	Any authorship	No. of publications	Lead author	No. of publications	Lead on peer reviewed articles	No. of publications
1	R. Kocsis	30	R. Kocsis	27	R. Kocsis	22
2	L. Alison*	24	D. Canter	18	C. Bennell*	11
3	D. Canter*	24	L. Alison	12	D. Canter*	11
4	C. Bennell	16	C. Bennell	11	P. Santilla	8
5	E. Beauregard	15	J. Douglas	9	C. G. Salfati*	7
6	R. Hazelwood	14	R. Hazelwood*	8	E. Beauregard*	6
7	J. Douglas*	13	P. Santtila*	8	B. Snook*	6
8	P. Santilla*	13	E. Beauregard*	7	L. Alison*	5
9	R. Ressler*	11	R. Holmes*	7	B. Fox*	5
10	C. G. Salfati*	11	R. Ressler*	7	A. Goodwill*	5
11	A. Burgess*	10	C. G. Salfati*	7	M. Tonkin*	5
12	J. Woodhams	10	B. Fox*	6	N. Deslauriers-Varin*	4
13	D. Farrington*	9	W. Petherick*	6	H. Häkkinen*	4
14	A. Goodwill*	9	B. Snook*	6	H. Chan*	3
15	B. Snook*	9	A. Goodwill*	5	J. Davis*	3
16	J. Warren*	9	H. Häkkinen*	5	L. Miller*	3
17	H. Häkkinen	8	M. Tonkin*	5	L. Schlesinger*	3
18	R. Bull*	7	J. Davis*	4	J. Warren*	3
19	R. Holmes*	7	N. Deslauriers-Varin*	4	J. Woodhams*	3
20	J. Jackson*	7	W. Geberth*	4		
21	G. Palermo*	7	J. Jackson*	4		
22	W. Petherick*	7	J.A. Scherer*	4		
23	B. Fox*	6	J. Woodhams*	4		
24	H. Irwin*	6				
25	J. Proulx*	6				
26	M. Tonkin*	6				

* Indicates a tie for the position, with all qualifying authors presented in alphabetical order. Total authors (first three) $n = 852$, lead authors $n = 426$, peer reviewed lead authors $n = 269$.

In each analysis, Richard Kocsis, a forensic psychologist in independent practice in Australia, was found to be the top producer of OP publications in all categories since 1976. Kocsis had 27 publications as lead author, was lead author on 22 peer reviewed journal articles, and was one of the first three authors on 30 total publications. David Canter, Director of the International Research Centre in Investigative Psychology at the University of Huddersfield in the United Kingdom, was ranked in the top three on all productivity metrics, whereas Craig Bennell, psychologist and Director of the Police Research Laboratory at Carleton University in

Canada, was consistently ranked in the top four on all metrics. Former FBI Special Agent and BSU profiler John Douglas ranked fifth in terms of lead authorship and seventh for overall authorship, but did not qualify as a prolific author in peer reviewed journal articles. All three members of the original FBI profiling team (Douglas, Ressler, and Hazelwood) were ranked among the most prolific authors in terms of lead authorship and any authorship, but not for peer reviewed journal articles. However, being ranked as the most prolific author in OP using all three criteria was a feat accomplished by only 13 people in the world (Kocsis, Canter, Alison, Bennell, Beauregard, Santtila, Salfati, Woodhams, Goodwill, Snook, Häkkänen, Tonkin, and Fox). For a full list of the most prolific authors in offender profiling, see Table 2.

To evaluate which authors and publications have had the highest impact within the field of OP, measured objectively using a uniform standard, an analysis of the total citations in Google Scholar for all 426 publications in the study was conducted. Like journal Impact Factors, which reflect the frequency in which the average article in a journal has been cited in the previous year as a primary measure of a journal's impact on the field (Thomson Reuters, 2016), citation counts also measure the number of times an article has been cited by other scholars, in order to measure a publication's impact on a given field.

On the basis of the standardized impact score for each item in the population of articles, the 15 publications with the highest impact scores (i.e., relevance/impact on the field) are presented in Table 3. It is interesting to note that, of the top 15 most cited publications, only five, are peer reviewed journal articles (Canter, 2000; Canter et al., 2003, 2004; Canter & Fritzon, 1998; Robertiello & Terry, 2007). The remainder are either books, such as Holmes and Holmes (1996) and Hickey (1991), book chapters, such as Canter (2010), or autobiographies, such as Douglas and Olshaker (1995). It is also interesting to note that, although the field of OP has been producing publications for 40 years, most of the highly cited research was produced between 1994 and 2004. Although the citation counts are not a measure the quality of publications, they do measure the influence a publication has had on future works. Consequently, the high number of citations for the OP publications is quite remarkable. Three of the top five most cited publications had citation counts over 500 (and the other two were nearly at 500), and in total, the top 15 OP publications were cited a total of 5,275 times.

Most Popular Outlets for OP Publications From 1976 to 2016

An analysis was conducted to determine the top 10 most popular outlets for publications on OP over the last 4 decades. Of the 426 publications, 103 were published as book chapters or books (24%), making this the most common outlet to date. The most popular journal outlet for OP publications is the *Journal of Investigative Psychology and Offender Profiling* (8%; $n = 33$), followed by the *International Journal of Offender Therapy and Comparative Criminology* (6%; $n = 25$). The *FBI Law Enforcement Bulletin*, which is not a peer reviewed outlet, was the third most common outlet for articles on OP (5%; $n = 20$), whereas the highly ranked journal *Criminal*

Justice and Behavior was the fourth most popular home of profiling publications (4%; $n = 18$).^{6 7} The remaining most popular outlets were all peer reviewed journals, in the following order: 5, *Legal and Criminological Psychology* ($n = 12$); 6, *Psychology, Crime, & Law* ($n = 11$); 7, *Homicide Studies* and the *Journal of Police & Criminal Psychology* ($n = 10$); and a three-way tie by *Aggression and Violent Behavior*, *Behavioral Sciences and the Law*, and the *Journal of Interpersonal Violence* ($n = 9$).

Table 3
Top 15 Most Cited Publications in Offender Profiling Since 1976

Rank	Author(s)	Title	Year	Total citations	Standardized impact score
1	R. Ressler, A. Burgess, & J. Douglas	Sexual homicide: Patterns and motives ⁺	1988	919	32.8
2	B. Turvey	Criminal profiling: An introduction to behavioral evidence analysis ⁺	1999	504	29.6
3	E. Hickey	Serial murderers and their victims ⁺	1991	692	27.7
4	R. Holmes & S. Holmes	Serial murder ⁺	1998	451	25.1
5	R. Holmes & S. Holmes	Profiling violent crime: An investigative tool ⁺	1996	487	24.4
6	D. Canter	Criminal shadows: Inside the mind of the serial killer ⁺	1995	459	21.9
7	D. Canter, L. Alison, E. Alison, & N. Wentink	The organized/disorganized typology of serial murder: Myth or model? [*]	2004	207	17.2
8	P. Jenkins	Using murder: The social construction of serial homicide ⁺	1994	372	16.9
9	G. Robertiello & K. Terry	Can we profile sex offenders? A review of sex offender typologies [*]	2007	150	16.7
10	D. Canter	Offender profiling	2010	96	16.0
11	D. Canter	Offender profiling and criminal differentiation ⁺⁺	2000	251	15.7
12	P. Ainsworth	Offender profiling and crime analysis	1997	299	14.3
13	J. Douglas & M. Olshaker	Mind hunter: inside the FBI's elite serial crime unit ⁺	1995	299	14.2
14	D. Canter & K. Fritzon	Differentiating arsonists: A model of firesetting actions and characteristics ⁺⁺	1998	254	14.1
15	D. Canter, C. Bennell, L. Alison, & S. Reddy	Differentiating sex offenses: A behaviourally based classification of stranger rapes [*]	2003	174	13.4

* Indicates peer reviewed article. + Indicates top 15 highest impact publication in total citation count.

Departments Producing Most OP Publications From 1976 to 2016

To determine the departments producing the highest volumes of publications on OP since 1976, an analysis of the first author's departmental affiliation for all 426 identified publications was conducted. The most prolific single department was the FBI's BSU, as this unit produced nearly 8% of all publications on OP ($n = 33$). The second largest producer of OP publications was Richard Kocsis' independent practice, accounting for about 6% of all publications ($n = 24$).⁸ The International Centre for Investigative Psychology at the University of Huddersfield in the United Kingdom was third ($n = 15$; 4%), and the Department of Psychological Science at the

⁶ Articles submitted to the *FBI Law Enforcement Bulletin* undergo an internal review by FBI employees selected by the editor (an FBI employee) and may give preference to FBI employees and collaborators. Additionally, after an article receives approval by reviewers, FBI management may (and have) rejected accepted articles for a variety of reasons that may or may not be made clear to author(s). This process does not qualify as peer review.

⁷ Journal rankings were determined on the basis of each journal's 2016 Impact Factor from the Thomson Reuters, 2016 Journal Citation Reports Index. A journal's impact factor is measured using the number of times that articles published in a specific journal in the two previous years were cited the next year (Thomson Reuters, 2016). Of the eight journals, *Criminal Justice and Behavior* had the highest Impact Factor (= 1.90).

⁸ Kocsis conducted OP research at the University of New England in Australia prior to starting his private practice.

University of Liverpool ranked fourth ($n = 14$; 3%). Tied for fifth most prolific departments in the field of OP are the Department of Criminology at the University of South Florida in Tampa and the Department of Psychology at Carleton University in Canada ($n = 12$; 3%). Seventh place is the Psychology Department at Memorial University of Newfoundland, Canada ($n = 8$; 2%). A three-way tie for eighth place was found for the Department of Psychology at John Jay College of Criminal Justice in New York City, Department of Justice Administration at the University of Louisville and the School of Criminology at Simon Fraser University in Canada ($n = 7$; 2%). It is important to note that the top 10 departments span four countries on three different continents, and that psychology, criminology, law enforcement, and independent practice are all represented on the list.

Analysis of Results in OP Publications From 1976 to 2016

Of the 426 total publications, there have been 370 articles, books, chapters, and reports written on “traditional” OP from 1976 to 2016. However, it is currently unknown what conclusions can be drawn from this body of literature. No study has analyzed the cumulative findings from these publications to indicate the most replicated number and types of profiles for a variety of crimes. Although no effect sizes are present in profile development publications, this study is the first to conduct a meta-analysis of the existent literature on OP and indicate the most consistent profiles developed based on 40 years of literature conducted across the globe.

In total, 62 publications have developed or proposed specific profiles for six major crime types (homicide, sexual assault, burglary, robbery, arson, and pedophilia) and a number of other minor offenses or subtypes of major crimes. These publications, including the number and type of proposed profiles, sample size (if applicable), and study location, are presented in Table 4.

A second methodological quality evaluation was conducted for the 62 profile development publications. In total, 71% were peer reviewed ($n = 44$), and over twice the rate of publications in the full sample used a population, probability or random sampling (37%, $n = 23$) whereas 40% used a convenience or nonprobability sampling method ($n = 25$). About 11% of studies used a sample of 400 or more ($n = 7$) and 79% used samples of less than 400. The majority (77%) of articles used six or more variables to develop the profiles ($n = 48$), and 13% used one to five variables ($n = 8$). About 65% of profiles were developed using an advanced or inferential statistical analysis ($n = 40$), whereas 19% used descriptive statistics ($n = 12$). The profile development studies produced a mean total quality score of 7.03 ($SD = 2.25$) out of 10. Overall, this analysis indicates the profile development publications tend to be of relatively high quality.

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Table 4

Results of Research Developing Offender Profiles

Study	Location	N	No. of profiles	All proposed profile types
Homicide				
Bijleveld and Smit (2006)	Netherlands	202	4	Utilitarian, interpersonal, planned, emotional
Canter et al. (2004)	USA	100	4	Mutilation, sexual control, plunder, execution
Canter and Wentink (2004)	USA	100	4	Mission, visionary, lust, thrill
Geberth (1996)	USA	0	6	Interpersonal dispute, sexual assault, lust murder, serial murder, robbery, homophobic assaults
Hickey (1991)	USA	154	3	Traveling, local, place-specific
Holmes and de Burger (1985)	USA	110	3	Geographically stable, geographically transient, mixed
Holmes and de Burger (1988)	USA	110	6	Visionary, mission, hedonistic (lust, thrill, comfort), power/control
Holmes, de Burger, and Holmes (1988)	USA	0	4	Visionary, mission, hedonistic, power/control
Horning, Salfati, and Crawford (2010)	USA	77	4	Specialist (violent), specialist (sexual), specialist (burglary/theft), generalist
James and Proulx (2016)	—	45	2	Approach explicit, sadistic
Ressler and Burgess (1985b)	USA	36	2	Organized, disorganized
Salfati and DuPont (2006)	Canada	75	2	Expressive, instrumental
Santtila et al. (2003)	Finland	502	3	Instrumental, expressive, blood, expressive, intimate
Zaitzu (2010)	Japan	96	2	Instrumental, expressive
Sexual Homicide				
Beauregard and Field (2008)	Canada	85	3	Organized, disorganized, mixed
Beauregard and Proulx (2002)	Canada	36	2	Sadistic, anger
Beauregard and Proulx (2007)	Canada	10	2	Avenger, sexual predator
Keppel and Walter (1999)	USA	4	4	Power assertive, power-reassurance, anger-retaliatory, anger-excitation
Kocsis (1999)	Australia	86	4	Predator, perversion, fury, rape
Last and Fritzton (2005)	USA	82	4	Moderate expressiveness (planned), high expressiveness, low expressiveness, moderate expressiveness (unplanned)
Ressler, Burgess, and Douglas (1988)	USA	36	3	Organized, disorganized, mixed
Salfati and Taylor (2006)	UK	74	3	Exploit, control, violent
Schlesinger (2007)	USA	0	2	Catathymic, compulsive
Sewall, Krupp, and Lalumière (2013)	Canada	82	3	Competitively disadvantaged, psychopathic/slashers, Sadistic
Stefanska et al. (2015)	UK	129	3	Deviance driven, grievance driven, sexually driven
Sexual Assault				
Canter and Heritage (1990)	UK	66	5	Sexuality, violence, impersonal, criminality, intimacy
Canter et al. (2003)	UK	112	4	Hostility, control, theft, involvement
Deslauriers-Varin and Beauregard (2014b)	Canada	72	4	Typical, opportunistic, explosive, chronic
Deslauriers-Varin and Beauregard (2010)	Canada	361	6	Home (intrusion, invited), outdoor (non-coercive, coercive), social (onsite, offsite)
Deslauriers-Varin and Beauregard (2013)	Canada	361	4	Victim's home, neighborhood, shopping center, offender's home
Gerard, Mormont, and Kocsis (2007)	Belgium	33	2	Opportunistic-impulsive, sadistic-calculator
Goodwill, Allen, and Kolarevic (2014)	Serbia	150	3	Violence and control, attempt, persuasion and sexual
Häkkinen, Lindlöf, and Santtila (2004)	Finland	100	3	Hostility, Involvement; Theft
Hazelwood and Warren (2000)	USA	0	2	Impulsive-criminally unsophisticated, reactive, ritualistic-diverse paraphilic interests
House (1997)	Canada	60	4	Aggression, criminality, intimacy, sadism
Kocsis, Cooksey, and Irwin (2002a)	Australia	62	4	Brutal, intercourse, chaotic, ritual
Ressler et al. (1986)	USA	118	2	Organized, disorganized
Warren et al. (1991)	USA	41	4	Power-assertive, power-reassurance, anger-retaliatory, anger-excitation
Warren et al. (1999)	USA	108	2	Increasesers, non-increasers
Arson				
Canter and Fritzton (1998)	UK	175	4	Expressive, instrumental, revenge, crime concealment
Häkkinen, Lindlöf, and Santtila (2004)	Finland	189	4	Offense: expressive, instrumental, person-target, object-target Offender: self-destructive, serial, criminal, adolescent
Harris and Rice (1996)	Canada	243	4	Psychotics, unassertives, multi-firesetters, criminals
Icove and Estepp (1987)	USA	1016	6	Vandalism, excitement, revenge, crime concealment, profit, other
Kocsis, Irwin, and Hayes (1998)	Australia	45	2	Organized, disorganized
Kocsis and Cooksey (2002)	Australia	148	5	Common, thrill, anger, wanton, sexual
Rider (1980)	USA	125,513	10	Typical incarcerated adult male, adult revenge, jealousy motivated adult male, would-be-hero (attention-seeking) male, volunteer fireman solitary, fire "buff," pyromaniac, excitement, typical female, schizophrenic
Santtila et al. (2003)	UK	230	2	Depressed, Delinquent

Table 4 (continued)

Study	Location	N	No. of profiles	All proposed profile types
Sexual Burglary				
Schlesinger and Revitch (1999)	USA	52	2	Fetish, voyeuristic
Pedneault, Harris, and Knight (2012)	UK	224	3	Fetishistic noncontact, versatile contact, sexually oriented contact
Burglary				
Farrington and Lambert (1997)	UK	655	4	Residential daytime, disorganized, weekday monetary gain, opportunistic
Fox and Farrington (2012)	USA	405	4	Organized, disorganized; Opportunistic, interpersonal
Merry and Harsent (2000)	UK	60	4	Intruders, pilferers, raiders, invaders
Santtila, Rittvanen, and Mokros (2004)	Finland	224	4	Spontaneous, interrupted, basic, opportunistic
Robbery				
Alison, Rockett, Deprez, and Watts (2000)	UK	144	3	Bandits, cowboys, Robin's men
Goodwill et al. (2013)	UK	28	4	Con, blitz, confrontation, snatch
Pedophilia				
Canter, Hughes, and Kirby (1998)	UK	97	3	Aggressive, intimate, criminal opportunist
Kuznestov, Pierson, and Harry (1992)	USA	827	3	Heavies, moderates, lights
Other Offenses				
Chan et al. (2014)	Japan	60	3	Novice-moderately-active, intermediate-inactive, experienced-active
Kapardis and Krambia-Kapardis (2004)	Cyprus	0	12	Predator/career fraud offender, opportunist, fraud under an assumed professional identity, serial fraud in response to financial pressure on family, personal justice, isolated fraud, serial fraud to solve personal financial problem, serial fraud due to vice, isolated fraud to restore social identity, serial fraud by unscrupulous deceiver, serial fraud to assist loved ones with financial problems
Lai et al. (2013)	Hong Kong	114	12	Music downloaders, movie downloaders, P2P downloaders, anime/e-book/porn downloaders, cyberlocker downloaders, forum downloaders, forum sharers, P2P public sharers, P2P private sharers, anime/e-book/porn sharers, cyberlocker sharers, media-shifter sharers
Shaw and Fischer (2005)	USA	10	3	Hackers, proprietors, avengers
Strentz (1988)	USA	0	2	Leaders, followers

Note. Total publications $n = 62$.

Homicide was the most common offense profiled, with 25 publications (40%) proposing profiles for homicide. Of these, 11 publications focused specifically on sexual homicide, which combines sexual assault and murder, and 14 publications developed profiles for homicide in general. The second most common crime to profile was sexual assault, with 14 total. Eight publications developed profiles for arson, and six profiles were developed for burglary (including two for sexual burglary). Finally, two publications each proposed profiles for robbery, pedophilia, fraud, and cybercrime, and one profile has been developed for terrorism. The samples used to develop the profiles for these offenses over the last 40 years range in size from 0 to 125,513. Excluding the outlier, the largest sample comprised 1,016 cases. This yields a mean sample size of 140.59 across 61 publications. The median sample size is 100.

The United States had the plurality (39%) of publications developing offender profiles ($n = 24$), followed by the United Kingdom (19%; $n = 12$) and Canada (16%; $n = 10$). Over half of the profiles developed for homicide were from the United States (52%; $n = 13$), whereas Canada was the most common location for the studies on sexual assault (36%, $n = 5$). The United Kingdom had the most offender profiling publications on burglary (38%; $n = 3$), and both of the profiles developed for robbery (100%; $n = 2$). Other nations which produced profiles of offenders include Australia (6%; $n = 4$), Finland (6%; $n = 4$), Japan (3%; $n = 2$), the Netherlands (2%; $n = 1$), Hong Kong (2%; $n = 1$), Cyprus (2%; $n = 1$), and Belgium (2%; $n = 1$).

The results of the 62 profiling publications range in variety in terms of the number and type of profiles developed. Although Table 4 presents a summary of findings from each

publication, Table 5 shows results of an analysis of the recurring profiles for each crime type.

Table 5

Analysis of Research Developing Offender Profiles

Offense	Mode no. of profiles	Mode vs. total	Range	Recurring profiles
Homicide	4	5 of 14	2–6	Expressive, instrumental, visionary, hedonistic, power/control, traveling, local
Sexual homicide	3	5 of 11	2–4	Sadistic, sexual, anger/fury, power/control, organized, disorganized
Sexual assault	4	6 of 14	2–6	Hostility, involvement, opportunistic, disorganized/chaotic, ritual, power/control
Arson	4	3 of 8	2–10	Expressive, instrumental, crime concealment, revenge
Burglary	4	4 of 4	4	Opportunistic, disorganized/pilferers
Sexual burglary	*	*	2–3	Fetish
Robbery	*	*	3–4	
Pedophilia	3	2 of 2	3	
Fraud	*	*	3–12	Experienced/career fraud offender, Novice/isolated
Cybercrime	*	*	3–12	
Terrorism	*	*	2	

Note. Analysis of profiles calculated using results from publications developing offender profiles.

* Indicates that there was no mode or recurring profiles in the sampled studies.

Among the 14 publications which developed profiles for homicide, the number of profiles ranged from two to six unique subtypes. The mode number of profile subtypes was four, as 36% of the 14 studies ($n = 5$) suggested that four profiles of homicide exist. Although most publications had unique labels for the profile subtypes, analysis of these labels indicates that the most common recurring profiles for homicide are *expressive*, *instrumental*, *visionary*, *hedonistic*, *power/control*, *traveling*, and *local* offenders. To illustrate the variation in these profile types, we submit that *expressive homicides* as emotion-laden and committed to relieve the offender's emotional distress or anger (Salfati & DuPont, 2006); *instrumental homicides* achieve a goal such as revenge, financial gain, or crime concealment (Zaitso, 2010); *visionary killers* murder in response to voices or visions from a good or evil power; *hedonistic offenders* are thrill-seekers who gain satisfaction from the act of homicide; *power/control offenders* kill to feel power over helpless victims; *traveling murderers* may kill across thousands of miles; and *local offenders* do not leave their comfort zone (Hickey, 1991).

Sexual homicide is considered a unique subset within the OP field, and an analysis suggests that 45% of publications ($n = 5$) indicate three profiles of sexual homicide exist. The range of suggested profiles was more limited for sexual homicide, ranging from two to four profile subtypes across the 11 publications. The most common profiles for sexual homicide are *sadistic*, *sexual*, *anger/fury*, *power/control*, *organized*, and *disorganized* offenders. Profiles developed for sexual assault ranged in from two to six subtypes, with four being the most common across the 14 publications on the offense (43%; $n = 6$). There was a notable variety in subtypes for sexual assault, with the most prevalent being *hostility*, *involvement*, *opportunistic*, *disorganized/chaotic*, *ritual*, and *power/control* types of offenders.

The eight publications on arson suggested a wide variation in profiles, ranging from two to 10 subtypes. The most common number of profiles for arson was four, as proposed by 38% of the eight publications on arson ($n = 3$). The most common profiles proposed for arson were limited, and include *expressive*, *instrumental*, *crime concealment*, and *revenge* offenders.

A total of four articles proposing profiles for burglary have been published, and incredibly, all indicate that there are four profiles of burglary. However, the specific types of profiles proposed differ among the studies, and only two subtypes, opportunistic and disorganized/pilferer offenders were repeatedly suggested in the resultant burglary profiles.

Two publications addressed the subset of sexual burglaries, but there was no consensus on the number of profiles. Although one study found two subtypes and the other suggested that three exist, both studies identified a profile of fetish offenders. Similarly, only two studies on robbery profiles have been conducted, and neither resulted in the same number or types of profile subtypes. Specifically, the number of profiles for robbery ranged from three to four, and there were no recurring subtypes of profiles across the two studies on robbery. Additionally, two studies aimed to develop profiles for pedophilia, and both suggested that there are three profiles of offenders. However, there was no overlap in the profile subtypes proposed by each study.

Of the five remaining publications of other offense types, there was no consensus on the number of profiles for fraud and cybercrime. In fact, the two studies conducted on each offense yielded the widest array of proposed profiles, ranging from three to 12 subtypes for both fraud and cybercrime. Although there were no recurring profile subtypes for cybercrime, there were two subtypes identified in both studies on fraud offenders: novice/isolated and experienced/career fraud offenders. The single study developing profiles for terrorism suggested two profiles of terrorists exist: leaders and followers.

Meta-Analysis of CLA Research Conducted From 2002 to 2016

To determine the cumulative level of accuracy when linking cases in CLA, and how CLA accuracy varies depending on crime types, data location, and crime scene behaviors, a meta-analysis of all available CLA research and findings was conducted based upon the search terms: *case linkage analysis, case linkage, crime linkage, crime linkage analysis, behavioral linkage, behavior linkage, crime behavior consistency, behavioral consistency, and behavioral consistency analysis*. This meta-analysis builds upon the study conducted by Bennell and colleagues (2013), which presented a descriptive analysis of CLA research published from January 2012 through January 2013, but did not contain an analysis of effect size.

To conduct the meta-analysis of CLA research, standardized effect size measures and estimates of variance were required for inclusion, and coded for analysis (Lipsey & Wilson, 2001). Effect size in CLA is typically determined using the AUC, which is a standardized effect size measure of diagnostic accuracy, and typically provided for the behavioral domains used to link crimes (e.g., MO, target selection behaviors, and intercrime distance). The AUC, calculated using a ROC curve, indicates the probability that a finding based upon a certain measure is accurate. AUC scores range from 0.0 to 1.0, where 1.0 indicates perfect accuracy, and .50 indicates chance/randomness. Anything less than .50 indicates accuracy worse than chance. In CLA, higher AUC values indicate a higher likelihood that a series of crimes was truly committed by the same offender and are based the criminal behavior selected for analysis (Bennell et al., 2013). According to Swets (1988), AUCs between .50 and .70 indicate low predictive accuracy, AUCs between .70 and .90 indicate “good” predictive accuracy, and AUCs of .90 to 1.0 indicate high to perfect predictive accuracy. When available, the standard error for

each AUC was used as the estimate of its variance. If the effect size or estimate of variance was not provided, the study was noted, but could not to be used in meta-analysis calculations.

On the basis of the full dataset of all 426 publications, a total of 39 studies on CLA were published from January 1, 2002 through December 31, 2016. Of those, 18 met the inclusion criteria of utilizing empirical data and producing comparable effect sizes and measurements of variance. These studies often included multiple case linkage results based upon various behavioral domains, multiple crimes, and/or multiple data sets. As the most common behavioral domains used in these studies related to intercrime distance, target selection, MO behaviors, and a composite of all crime scene behaviors, these domains were selected for analysis, when available. This yielded a total population of 40 AUC effect sizes. Of these, 34 were accompanied with an estimate of variance.⁹ Details on the 18 studies in the meta-analysis and their results are presented in Table 6.

Table 6
Results of All Published Research on Case Linkage Analysis From 2002 to 2016

Study	Crime type	Location	N	Behavioral domain	AUC	SE
Homicide						
Melnik et al. (2011)	Homicide	USA	237	All MO behaviors	.96	.02
Sexual Offenses						
Bennell et al. (2009)	Sexual assault	UK	126	All MO behaviors	.75	.05
Bennell et al. (2010)	Sexual assault	UK	71	All MO behaviors	.81	.04
Oziel, Goodwill, and Beauregard (2015)	Sexual assault	Canada	49	Target selection	.87	.03
				All variables	.92	.02
Slater, Woodhams, and Hamilton-Giachritsis (2015)	Sexual offenses	UK	365	All MO behaviors	.87	.02
Winter et al. (2013)	Rape	UK	219	All MO behaviors	.84	.02
Woodhams and Labuschagne (2012)	Sexual assault	South Africa	119	All MO behaviors	.88	.02
Yokota et al. (2017)	Sexual offenses	Japan	720	All MO behaviors	.83	.03
Burglary						
Bennell and Canter (2002)	Commercial burglary	UK	86	Intercrime distance	.80	—
				Target selection	.68	—
				All variables	.81	—
Bennell and Jones (2005)	Commercial burglary	UK		Intercrime distance	.76	.07
	Residential burglary	UK		Target selection	.62	.05
				Intercrime distance	.85	.06
				Target selection	.53	.08
Markson, Woodhams, and Bond (2010)	Residential burglary	UK	160	Intercrime distance	.90	—
				Target selection	.54	—
				All MO behaviors	.61	—
Melnik et al. (2011)	Residential burglary	UK	210	All MO behaviors	.62	.06
Tonkin, Santtila, and Bull (2012)	Residential burglary	Finland	234	Intercrime distance	.84	.09
				Target selection	.73	.09
				All MO behaviors	.72	.09
Tonkin, Santtila, and Bull (2012)	Residential burglary	Finland	160	Intercrime distance	.83	.07
				Target selection	.77	.08
				All MO behaviors	.82	.07
Robbery						
Burrell, Bull, and Bond (2012)	Robbery	UK	166	Intercrime distance	.75	.09
				Target selection	.69	.11
				All MO behaviors	.70	.12
Woodhams and Teye (2007)	Commercial robbery	UK	160	Intercrime distance	.89	.07
				All variables	.95	.04
Car Theft						
Davies, Tonkin, Bull, and Bond (2012)	Car theft	UK	258	Intercrime distance	.91	.06
				Target selection	.76	.08
Tonkin, Grant, and Bond (2008)	Car theft	UK	386	Intercrime distance	.81	.05
				Target selection	.57	.06
Tonkin, Santtila, and Bull (2012)	Car theft	UK	376	Intercrime distance	.82	.04
				Target selection	.54	.06
				All MO behaviors	.56	.06
Various Crimes						
Tonkin et al. (2011)	Across crime types	UK	200	Intercrime distance	.90	.07
	Within crime types			Intercrime distance	.91	.06

Note. AUC = area under the curve. Total studies $n = 18$. Total results $n = 40$. Only results for the inter-crime distance, target selection, all modus operandi (MO) behaviors, and "all variable" behavioral domains shown when available.

⁹ An effort was made to acquire missing information (e.g. estimates of variance) from the first authors of relevant publications for the meta-analysis. However, because of the time elapsed and technological issues no missing information could be acquired.

CLA has been performed on five types of crime (homicide, sexual offenses, burglary, robbery, and car theft) using data derived from six countries (United Kingdom, Canada, United States, Finland, South Africa, and Japan). The samples utilized in these studies ranged in size from 49 to 720 offenses. An analysis of heterogeneity showed that the effect sizes in the 34 studies were generally homogeneous ($Q = 10.17$, $I^2 = 0.0$; $CI [0.0, 0.75]$; $df = 33$; heterogeneity $p = 1.00$, model $p < .0001$). Although the homogeneity in the results initially appears low, since there was a broad confidence interval around the I^2 , a random effects model was used to calculate the weighted mean effect sizes in the meta-analysis. Overall, AUCs ranged from .53 (target selection in residential burglary) to .96 (all MO behaviors in homicide). The overall effect size for the articles in the population was .83 (95% CI [.76, .89]). This is a relatively high effect size, suggesting that overall, research produced on CLA can link crimes in a series with reasonably high accuracy. A forest plot depicting the 34 studies included in the CLA meta-analysis, effect sizes, and standard errors is presented in Figure 1.

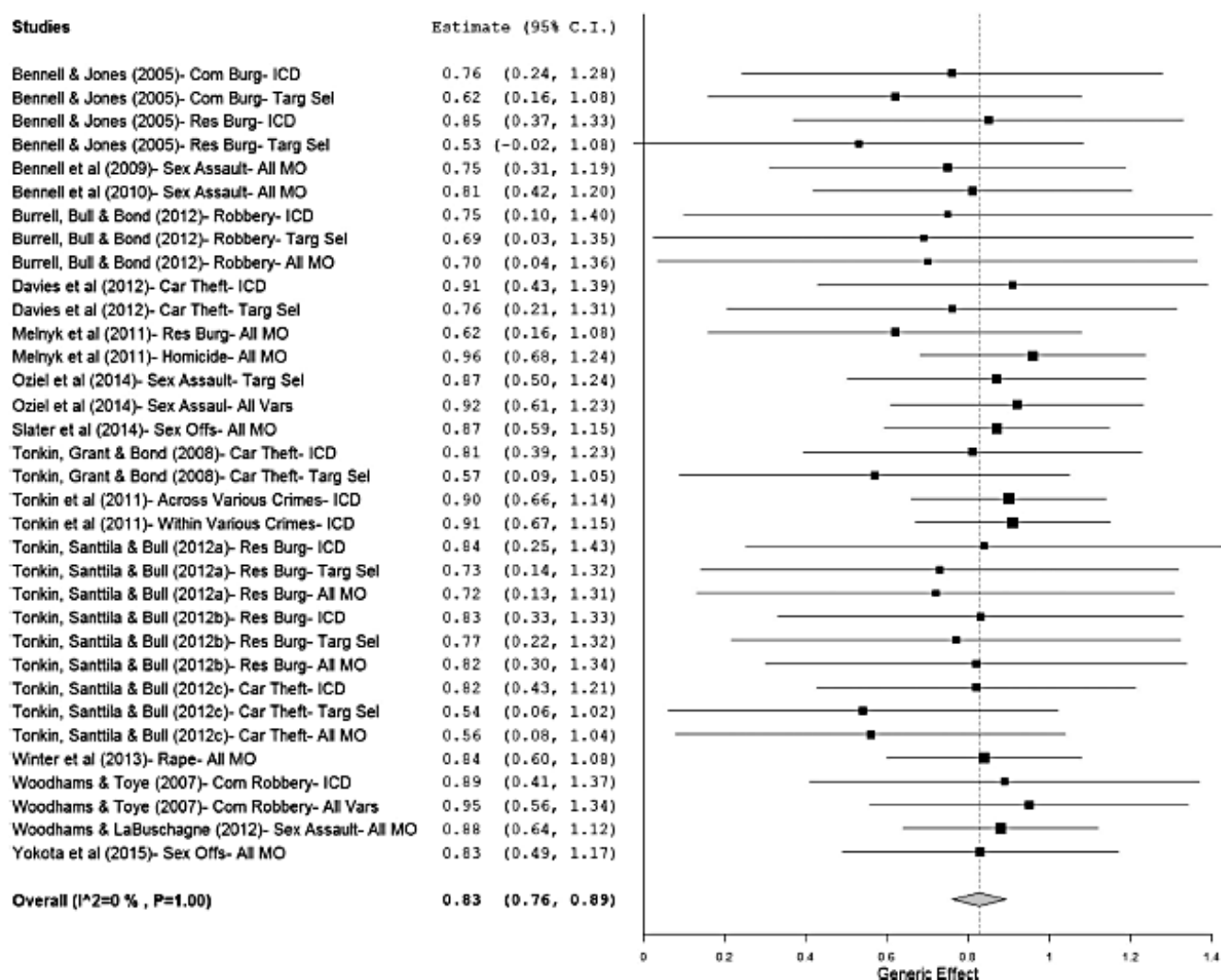


Figure 1. Forest plot of meta-analysis case linkage analysis publications using the area under the curve (AUC) results effect size. Targ sel = target selection variables; ICD = inter-crime distance; MO = modus operandi variables; All vars = all variables.

As there may be a greater tendency for studies with high effect sizes to be published, a publication bias analysis was conducted. Using a funnel plot (Light & Pillemer, 1984; Sedgwick, 2013), we analyzed the relationship between studies' error rates and effect sizes. In this case, a roughly even distribution among studies with strong and weak effect sizes was observed, indicating that there is no positive skew toward strong effect sizes in published studies. Analysis of the 40 AUCs indicates that 25.0% of results ($n = 10$) fall in the low (.50 to .69) range, 57.5% are moderate (.70 to .89; $n = 23$), and 17.5% of results are strong (.90 to 1.0; $n = 7$) effect sizes (Swets, 1988).

Additionally, a third methodological quality evaluation was conducted for the 18 CLA studies. About 72% of CLA studies used samples less than 400 ($n = 13$), though 72% drew upon a population or used probability or random sampling ($n = 13$). Over 94% of studies used six or more variables in the analyses ($n = 17$), 94% used advanced statistics ($n = 17$), and 100% underwent peer review ($n = 18$). The CLA studies produced a mean total quality score of 8.76 ($SD = 0.83$) out of 10, indicating that CLA studies have the highest level of overall quality among the OP publications in this review.

To examine potential variations in effect size across crime types, data sources, and crime scene behaviors, a series of follow-up analyses were conducted. A summary of findings for effect size estimates for each offense type, standard errors for each of the crime types, behavioral domains, and data locations are presented in Table 7.

Table 7
Meta-Analysis of Case Linkage AUC Results

Category	Measure	<i>N</i>	Estimate AUC	<i>SE</i>
Crime types	Homicide	1	.96	.14
	Sexual offenses*	8	.86	.06
	Burglary*	11	.73	.08
	Robbery*	5	.84	.12
	Car theft*	7	.72	.09
	Various crimes*	2	.90	.09
Behavioral domains	ICD*	11	.87	.06
	Target selection*	9	.69	.09
	All MO behaviors*	12	.83	.05
	All variables*	2	.93	.12
Homicide	All MO behaviors	1	.96	.14
Sexual offenses	Target selection	1	.87	.19
	All MO behaviors*	6	.84	.06
	All variables	1	.92	.16
Burglary	ICD*	4	.82	.13
	Target selection*	4	.66	.14
	All MO behaviors*	3	.71	.15
Robbery	ICD*	2	.84	.20
	Target selection	1	.69	.34
	All MO behaviors	1	.70	.34
	All variables	1	.95	.20
Car theft	ICD	3	.84	.13
	Target selection	3	.61	.15
	All MO behaviors	1	.56	.24
Various crimes	ICD (within crimes)	1	.90	.02
	ICD (across crimes)	1	.91	.02
Country	United Kingdom*	23	.80	.04
	United States	1	.96	.14
	Canada*	2	.90	.12
	Finland*	6	.79	.12
	South Africa	1	.88	.12
	Japan	1	.83	.17

Note. Meta-analysis of area under the curve (AUC) calculated using results from publications on case linkage analysis. All models shown with random effects. Full model: $n = 34$, $df = 33$, $Q = 10.17$, $I^2 = .0$ ($Q < df$), 95% CI [0.0, 0.75], $p = 1.00$. Overall model estimate: AUC = .83, CI [.76, .89], $p < .0001$. ICD = intercrime distance; MO = modus operandi.

* Indicates $p < .01$.

The results suggest that AUCs were slightly higher for person crimes compared with property crimes. Homicide yielded the highest overall AUC (.96), followed by sexual offenses (.86), and robbery (.84). Burglary yielded the highest AUC among property crimes at .73, followed closely by car theft at .72. The composite of various crimes had an AUC of .90. All AUC estimates for these offenses were in the “good” range, except for homicide, which is considered a very strong effect (but was based on only one study). Each reported AUC estimate was statistically significant at the $p < .01$ level.

When the major behavioral domains included in the analysis are disaggregated, it appears that the composite measure of all crime scene behavior variables yielded the largest AUC across crimes (.93), whereas all MO behaviors showed a relatively large AUC of .83. Intercrime distance, or the distance between multiple offenses, had a large AUC of .87, whereas target selection showed the lowest level of accuracy in predicting the likelihood of crimes being linked (.69). Each AUC estimate for the behavioral domains was statistically significant.

Visual inspection of the forest plot indicates that AUC estimates for a behavioral domain varies significantly across crime types. Specifically, target selection behaviors were the most accurate when linking sexual offenses (AUC = .87), followed by robbery (.69), burglary (.66), and finally car theft (.61). However, although target selection AUC estimates were statistically significant for burglary and car theft ($p < .01$), they were not statistically significant for linking sexual offenses and robberies (each based on only one study). With respect to the distance traveled to commit each crime, only burglary (AUC = .82) and robbery (.84) showed statistically significant AUC estimates, although the effect sizes for car theft (.84), across various crime types (.91) and within various crime types (.90) were quite strong. The composite measure of all crime scene behavior variables was only available for two crime types, sexual offenses (.92) and robbery (.95), and neither showed statistically significant AUC estimates (but both had only one case in the sample). Still, these AUC estimates for all variables were very large.

AUC estimates for all MO behaviors were calculated for five of the six crime types. While the MO behaviors AUC values for burglary (.71), robbery (.70), and sexual offenses (.84) were good, the AUC for MO behavior in homicide was an extremely strong predictor of crime linkage (.96), but very weak for car theft (.56). However, only the AUC estimates for sexual offenses and burglary were statistically significant among the all MO behavior domains, presumably because each remaining crime had only a single case in the analysis.

Finally, the AUCs for the 34 complete results in the meta-analysis were analyzed for strength of effect size across the nations that the crime samples were drawn from. As shown in Table 7, there is variability in the accuracy when linking cases, depending upon the location where the crimes took place. The strongest AUC was found in a study conducted in the United States (.96), followed closely by crimes committed in Canada (.90). Both were considered strong effects, although, the AUC estimate for the study in the United States (one case) was not statistically significant. The next AUCs, falling in the moderate to strong range at .88 and .83 were drawn from South Africa and Japan, respectively. However, both (based on only one case) were also not statistically significant predictors of overall case linkage accuracy. Finally, the two largest samples of results, which were drawn from the United Kingdom ($n = 23$) and Finland (n

= 6), yielded the lowest overall AUCs, at .80 for the United Kingdom and .79 for Finland. Both were statistically significant at the $p < .01$ level.

Discussion

This study presents a comprehensive statistical evaluation of 40 years of publications on the field of OP. Although dozens of profiles have been developed for various offenses, no analysis has been conducted to determine the specific recurring themes or profiles exist within the body of publications on OP. Additionally, as nearly 50% of the 426 articles, books, chapters, and reports written on OP were published in the last 10 years, after the last systematic reviews in OP took place, an updated and more inclusive review of the OP field is required.

Results of the systematic review and meta-analysis in this study indicate several key takeaway points regarding the state of the field. First, it is clear that there are stark new trends emerging in the rate, type, statistical sophistication, location, and affiliation of authors of publications in the field of OP. For instance, a sharp positive trend in the number of publications on OP was identified for each decade from 1976 to the present. Although not in the majority, many publications that were excluded from previous systematic reviews on OP, such as books, book chapters, reports, and magazine articles, comprised of 30% of the population. Also, while, there are a growing number of new profile proposals, very few evaluations of existing profiles or profiling strategies ($< 10\%$ of all publications) have been conducted to determine the level of accuracy of these profiles and methods. With respect to the scientific and statistical rigor of OP publications, the proportion of publications using advanced statistical analyses rose from 0% to 33% over the last 4 decades, and in the past 10 years the number of peer reviewed studies out-paced non-peer reviewed publications by a margin of three to one.

The present article was also the first to examine the location where OP research is being conducted, and the results indicate that, whereas most data were collected in the United States, far less research is currently conducted there. Instead, the United Kingdom and Canada have been rapidly increasing their research and publications on OP. In terms of authorship, this study showed that a growing number of criminologists and graduate students have been conducting research on OP in recent years, whereas the number of FBI Special Agents and profilers, who were once the highest proportion of OP authors, has now decreased to zero. Moreover, most research on OP is conducted by psychologists, which also appears to be increasing in rate over the last 2 decades. In general, academics are now producing the vast majority of literature on OP, a finding shared by both prior systematic reviews. These findings on trends in OP are important for future students, practitioners, attorneys, the news media, publishers, and our colleagues to be aware of, as we hope to keep directing OP in a more scientific and empirical direction.

The second major takeaway is from the analysis of recurring profiles developed over the last 40 years of OP. In the analysis of the 62 publications that have developed offender profiles, there was a considerable variation found in the number, characteristics, and terminology used to describe otherwise similar profile types. For instance, the modal number of homicide offender profiles (the most common crime profiled) in the literature was four. This finding is in sharp contrast to the pop culture depiction of the Organized and Disorganized serial killer profiles originally proposed by agents in the FBI's BSU in the 1980s (Douglas & Burgess, 1986).

Instead, studies on homicide clearly indicate that there are other profile types that fit the characteristics of various types of homicide offenders. The recurring profiles found in this study include expressive, instrumental, visionary, hedonistic, power/control, traveling, and local homicide offenders (see Hickey, 1991; Salfati & Dupont, 2006; Zaitsev, 2010).

Furthermore, some authors proposed profiles on the basis of the authors' investigative experience, MO at the crime scene, and review of OP literature. Other studies utilize advanced statistical analysis of all available crime scene information, to include MO and target selection behaviors, and produced statistical profiles to fit the data. Given the wide variety in methods and terminology used across the field, synthesis of the findings of OP as a whole is very difficult. In short, it is important for OP researchers to aim to scientifically test, replicate, and ideally, consolidate the terms used for profiles in order to streamline and advance the field of OP.

The final major takeaway stems from the meta-analysis of CLA research from 2002 to 2016. Results indicate that in general, CLA can be used successfully to link crimes in an offense series committed by a single offender. In fact, well over half of all reported AUCs were in the moderate to strong range, whereas almost 20% were very strong effect sizes. This aligns with, but is slightly higher than, the findings of Bennell et al. (2013). Additionally, in contrast to Bennell et al.'s (2013) findings, which found that ICD resulted in the highest effect sizes and MO behaviors showed lower accuracy rates in linking, this updated analysis found that the composite measure of all crime scene behavior variables yielded the largest mean effect size across crimes, and linking crimes based upon MO behaviors was largely accurate across studies.

With respect to linking accuracy across countries, another variation was found between the present and past research on the topic. While Bennell et al. (2013) reported that Finland had the highest average linking accuracy, the effect sizes for all other countries were not reported. In this study, the strongest effect was found in a study from the United States, followed by Canada, South Africa, and Japan. The United Kingdom and Finland showed two of the lowest average AUCs in this study. As these countries produced the most research on CLA, it is possible that more variability was introduced which potentially lowered the average AUC compared with other less-researched nations. However, with more data from the United Kingdom and Finland, the generalizability of these findings are increased. In short, more research on CLA is needed across nations including the United States, Canada, and beyond, in order to best determine the cumulative level of accuracy when linking cases for various crimes, locations, and behavioral domains.

Conclusion

In short, OP has exploded in popularity as both an investigative technique and a topic for many books, chapters, reports, and journal articles over the past several decades (Dowden et al., 2007). However, unlike many other fields where considerable research and practice is being done, which typically have rigorous evaluations and reviews to establish the "state of the art" and the overall success of the practice, the field of OP remains relatively close to where it started in terms of scientifically assessing what profiles exist, and how the profiles perform in actual police investigations. This has rightfully led to many strong critiques of OP, and caused a dark cloud over the reputation and results being produced by the field (see Bennell, Jones, Taylor, & Snook,

2006; Kocsis, 2006).

The results of this review and meta-analysis indicate that there is considerable improvement in the scientific rigor and self-assessment in the discipline. The last decade has shown sharp increases in the proportion of OP publications utilizing advanced statistics, as well as the number of evaluations conducted on the applied aspects of this work. Still, there is much further for the field to go.

Specifically, to address concerns that the field does not rise to the level of scientific credibility according *Daubert v. Merrell Dow Pharmaceuticals, Inc.* (1993; Bosco et al., 2010; Ebisike, 2008; Pakkanen et al., 2014), all future profiles should be developed using a solid empirical approach that relies on advanced statistical analysis of large data sets (not the intuition or experience of the author or the descriptive statistics of a handful of cases), and should undergo peer review prior to publication. This will help to streamline the vast number of methodologies used in the field, increase the quality of resultant profiles, and the acceptance of OP in the field.

Additionally, it is not enough to simply develop new profiles and then hope that their impact is positive, or even effective. Profiles should be implemented in police investigations and then evaluated for their effects on arrest rates in unsolved cases using an experimental design (see, e.g., Fox & Farrington, 2015). This will establish a known reliability/error rate, and evaluate which profiles are most effective when applied in actual police investigations. Although results of this study indicate that OP started off as a very different field 4 decades ago, OP appears to be on a positive trajectory in terms of the use of more scientific and statistical methods, data and analyses, and evaluations of our work. Continuation on this trajectory, particularly in the next 10 years, will help the field of OP transform from a “cocktail napkin pseudoscience” into an evidence-based discipline that produces research used to help police, inform policy, and ultimately, make the world a safer place.

Ultimately, the field of OP must consider Campbell’s (1976) original question and ask “Are we better at this than a bartender?” Although we have come quite a long way since that question was posed over 4 decades ago, the answer remains largely unknown. But, with the continued use of the scientific tools at our disposal, such as quantitative data, advanced statistics, experimental evaluations, and future meta-analyses, this goal can certainly be achieved.

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