Sexual Offender Treatment Effectiveness Within Cognitive-Behavioral Programs: A Meta-Analytic Investigation of General, Sexual, and Violent Recidivism

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The current sexual offender literature focuses on recidivism reduction in an effort to increase public safety. While cognitive-behavioral therapy (CBT) programs are considered a mainstream treatment method, it is essential to study recidivism as an indicator of treatment effectiveness. This meta-analysis examines research published since 1970 to determine the overall effectiveness of treatments in reducing recidivism among adult male sexual offenders. Decade of implementation and CBT treatment features are also assessed as moderator variables. The results from the 25 studies identified were converted into 42 weighted effect sizes utilizing a random-effects model. Significant overall effect sizes were found for sexual and violent/combination recidivism; however, multiple indices indicate heterogeneity in the effect sizes. Significant differences were found in the overall effectiveness of the treatments by decade, and the treatments delivered during the 1990s were found to be related to lower levels of sexual and violent/combination recidivism.

Key words: adult male sexual offender treatment; cognitive-behavioral therapy; males; meta-analysis; sexual offender; recidivism; sex offender treatment effectiveness; sex offender treatment efficacy; treatment effectiveness; treatment efficacy.

Historically, sexual offending has been considered a serious social issue due to both the lasting negative impact it has on many of its victims and the concern of public safety for those in the community. These important social issues were at the heart of the initial approach to sexual offender treatment taken by clinical specialists. While sexual offenders are stigmatized by many groups (e.g., law enforcement, the media, the community, non-sexual offenders), they are also continually degraded through general discussion, research focus and paper titles (Brown, 1999). As a result, the concept of sexual offender treatment as a service offered to this particular offender population is

regarded as controversial (Griffin & West, 2006).

As sexual offenders can be convicted for a range of different crimes, convictions and sentences are largely contingent upon the individual and the nature of his or her offense. As such, several approaches are generally utilized to treat sexual offenders. Some of these treatment contexts may include community-based sentencing alternatives, prison treatment programs, parole and probation treatment programs and sexual predator programs that are provided to those who are civilly committed (La Fond, 2005).

The history of sexual offender treatment

The first documented attempts at treating sexually deviant behavior occurred around the late nineteenth century (Laws & Marshall, 2003). Of these attempts, two broad treatment approaches emerged: psychological (i.e., assisting offenders to change how they think and act, and teaching them how to avoid committing sex crimes) and medical (i.e., methods such as surgical or chemical castration used to diminish libido; see La Fond, 2005). As the field has evolved, the 1970s has come to be viewed as the advent of the modern era of sexual offender treatment. At that time, several important contributions to the field emerged, including the further development of phallometric evaluations, the broadening of behavioral interventions and the first descriptions of more comprehensive treatment programs (Marshall & Laws, 2003).

In the 1980s, one of the most significant contributions was the adaptation and use of the relapse prevention model from the addiction field. Researchers began to identify commonalities between addictive behaviors and sexual aggression, especially in terms of their association with signs of relapse (Marlatt & Gordon, 1985). More specifically, the relapse prevention piece assists the male offender in identifying problematic situations that may place him at risk for reoffending, teaches strategies to

help him cope with these high-risk situations and helps him to gain control over his sexual behavior (Nelson, Miner, Marques, Russell, & Achterkirchen, 1989).

Throughout the 1990s more treatment programs became available worldwide, and research and publications became more prevalent. With the concept of integrative treatment models surfacing, many researchers came to collectively understand that the previously formulated theories (e.g., biological, environmental, social learning, behavioral, cognitive, etc.) were too simplistic to conceptualize sexual offending as the result of actions in only one domain. This led to the development of comprehensive approaches that integrate multiple theories of sexual offending by combining the physiological, psychological, social and environmental influences on the development and maintenance of sexual offending behaviors. As such, treatments are much more extensive and target many areas, including deviant sexual arousal, distorted cognition, pro-offending attitudes, problems with impulse control, social skills deficits, poor emotion regulation and environmental triggers (Marshall, Anderson, & Fernandez, 1999). In fact, multi-component cognitive-behavioral therapy (CBT) that incorporates relapse prevention was the preferred treatment modality for sexual offenders during the 1970s and remains predominant today (Marshall, 1999).

The most prevalent development accompanying the turn of the century was the increase in research on treatment effectiveness. Some of the first meta-analyses surfaced, providing interesting findings with significant clinical implications for working with this population. Over the many decades that sexual offender treatment has evolved, both psychological and medical approaches to treatment have been extensively researched (Marshall & Laws, 2003). As a result, a variety of different therapeutic modalities and treatment goals – primarily within psychological treatment approaches – have surfaced in response to rising etiological theories attempting to explain sexual offending behaviors.

As treatment options have continued to expand, a more integrative approach has developed that involves focusing on both cognition and behavior in order to seek change. As such, the most common and mainstream form of treatment available for sexual offenders across the United States (US) and Europe is CBT. This approach to treatment seeks a much more comprehensive conceptualization of sexual offending which incorporates physiological, psychological, social and environmental influences on the development and maintenance of sexual offending behaviors (Kirsch & Becker, 2006). A large body of research continues to accumulate that further demonstrates CBT's effectiveness as a mainstream treatment for sexual offenders (Alexander, 1999; Furby, Weinrott, & Blackshaw, 1989; Gallagher, Wilson, Hirschfield, Coggeshall, & MacKenzie, 1999; Hall, 1995; Hanson et al., 2002; Lösel & Schmucker, 2005; Quinn, Forsyth, & Mullen-Quinn, 2004).

Most of the research available to date on the sexual offender population consists of male sexual offenders. Consequently, sexual offending is generally considered a male phenomenon (Wijkman, Bijleveld, & Hendriks, 2010). As such, this leads many to state that in academic research, female perpetrators of sexual offenses are ignored (Grayston & De Luca, 1999). While the true prevalence of sexual abuse is currently unknown for sexual offenders, a meta-analysis conducted by Cortoni (2009) found that female sexual offenders represent about 5% of the sexual offender population. Although there are far less female sexual offenders than males, this figure is still evidentiary support that women are indeed capable of committing such offenses. Of the statistics available to date, these data strongly suggest that men still constitute the majority of sexual abuse offenders (Wijkman et al., 2010). A full literature review was completed relevant to female sexual offenders; however, it was not deemed relevant to this paper, and can be obtained by contacting the corresponding author.

Measuring treatment effectiveness

Even though sexual offender treatment is considered an established clinical specialty, evidence concerning its effectiveness has been rather slow to accumulate. In addition, treatment effectiveness has yet to be conclusively demonstrated (Harkins & Beech, 2007). As such, the question of whether or not sexual offender treatment works is a prime subject of debate within this field. Much of these concerns arise from the fact that relatively few well-designed studies of treatment efficacy have been conducted.

Historically, treatment evaluation research has not been of high quality. The initial efforts dedicated to the investigation of treatment effectiveness with sexual offenders did not yield promising results. In fact, some of these results contributed to the idea that sexual offender treatment is a waste of time and funding (Furby et al., 1989). Because some of these early studies do not even describe the subjects or the treatment approach utilized, the effects of treatment were difficult to evaluate. In some studies, the treatment groups were fundamentally different from the control groups that did not receive treatment. Furthermore, outcome studies typically relied on only one measure of outcome, notably recidivism data derived from official sources, such as probation, parole and arrest records (Washington State Institute for Public Policy, 1991).

Despite these initial problems, there is now a considerable body of research within the field that shows evidence of effectiveness specific to the cognitive-behavioral modality of treatment (Marshall & Barbaree, 1990; Quinn et al., 2004). Many other studies within the field have concluded that offering CBT-based treatment to sexual offenders reduces reoffending (Alexander, 1999; Furby et al., 1989; Gallagher et al., 1999; Hall, 1995; Hanson et al., 2002; Lösel & Schmucker, 2005). Furthermore, treatment models following cognitive-behavioral and relapse prevention techniques are the most effective, and

long-term follow-up increases the level of effectiveness (Quinn et al., 2004).

While there are several ways of measuring treatment effectiveness, there remains considerable debate surrounding which methods to use. Some believe that only the most scientifically rigorous techniques should be used if one hopes to be able to draw meaningful conclusions (Rice & Harris, 2003). On the other hand, others feel that less stringent criteria pertaining to control groups may be utilized to yield meaningful inferential results (Marshall et al., 1999).

Review of existing meta-analyses

The treatment-effectiveness literature on the sexual offender population has been slowly accumulating since the 1980s. In fact, one of the first reviews – conducted by Furby et al. (1989) – examines qualitative trends and patterns across studies in lieu of utilizing meta-analytic methods. The authors identify a pattern wherein the longer the follow-up period, the greater the percentage of men who will have committed another crime in the interim. In addition, they found no evidence that clinical treatment reduces rates of sexual reoffending in general. On the other hand, they did find some evidence that recidivism rates may be different for different types of offenders. From their initial review, the authors posited that progress in knowledge about sexual offender recidivism would continually elude those in the professional realm until adequate resources of time, money and research expertise were devoted to exploring the matter (Furby et al., 1989). Following this well-known review, more treatment effectiveness studies began to accumulate. Several meta-analyses with seminal results relevant to this body of literature are reviewed below.

Hall (1995) produced one of the first well-known meta-analyses conducted on sexual offender treatment, reviewing 12 studies and finding a small but robust effect size when treatment was compared to control conditions.

In general, the treatment effects are largest in samples with high base rates of recidivism. The institutionalized samples show a small effect size for treatment whereas a medium effect size was found for treatment in studies of outpatient samples. While cognitive-behavioral and hormonal treatments appear to be superior to behavioral treatments, medium effect sizes were found for both but are not significantly different in their effectiveness in preventing recidivism. More specifically, the mean treatment effect size for studies with follow-up periods of greater than five years is significantly greater than the mean treatment effect of those with periods of less than five years (Hall, 1995). Thus, effective treatments may influence the recidivism curve to be asymptotic (tending toward zero) after five years following treatment, whereas the effects of less effective treatments may wear off within five years.

According to a meta-analysis of 61 studies conducted by Hanson and Bussière (1998), offenders who fail to complete treatment are at increased risk for both sexual and general recidivism. An alternative explanation to this finding is that high-risk offenders are the most likely to quit or be removed from treatment. Although this meta-analytical review does not directly examine treatment effectiveness, the authors posit that treatment programs can contribute to community safety through their ability to monitor risk. Even if treatment effectiveness cannot be asserted, Hanson and Bussière (1998) reiterate that there is reliable evidence that the offenders who attend and cooperate with treatment are less likely to reoffend than those who reject treatment.

Polizzi, MacKenzie, and Hickman's (1999) meta-analysis of 21 studies found that non-prison-based sexual offender treatment programs using cognitive-behavioral treatment methods are effective in reducing the sexual offense recidivism rates of sexual offenders. While eight studies were deemed too lacking in scientific merit to include within the analysis, the remaining studies were found to

show approximately 50% statistically significant findings in favor of sexual offender treatment programs. Furthermore, of the six studies showing a positive treatment effect, four incorporated a cognitive-behavioral approach to treatment. Overall, Polizzi et al. (1999) concluded that non-prison-based sexual offender treatment programs were effective in reducing recidivism among sexual offenders, but that there was not enough evidentiary support to confirm the effectiveness of prison-based programs.

Hanson et al. (2002) examined 43 studies and a total of more than 9,000 offenders. Similar to Hall (1995) and Gallagher et al. (1999), Hanson et al. found the sexual offense recidivism rate to be lower across the treatment groups (12.3%) than the comparison groups (16.8%) in 38 studies. A similar pattern was found in 30 studies for general recidivism for both the treatment (27.9%) and comparison (39.2%) groups. In addition, those who dropped out of treatment had consistently higher sexual recidivism rates than those who completed treatment (with an Odds Ratio (OR) of 0.47; Hanson et al., 2002).

Hanson and Morton-Bourgon (2005) examined 82 studies and found that most sexual offenders are not caught for another sexual offense, and are more likely to recidivate with a non-sexual offense (with an overall recidivism rate of 36.2%). The observed sexual recidivism rate was found to be 13.7%. Also within this analysis, the authors examined predictors of sexual recidivism and found sexual deviancy and antisocial orientation to be the highest for both adult and adolescent sexual offenders. Further, it should be noted that many of the variables used within clinical assessments are found to have little or no relationship with recidivism, such as denial, low victim empathy and low motivation for treatment (Hanson & Morton-Bourgon, 2005).

Lösel and Schmucker (2005) examined 69 studies totaling more than 22,000 offenders between the treatment and control groups. This is currently the most comprehensive database available on sexual offender treatment outcomes. The authors found that treated offenders have lower sexual recidivism rates (11.1%) than controls (17.5%). Another interesting find is that organic treatments, notably surgical castration and hormonal medication, show larger effects than psychosocial interventions. Finally, among the psychological programs reviewed, cognitive-behavioral approaches reveal the most robust effect (Lösel & Schmucker, 2005).

Doren and Yates's (2008) meta-analysis of 10 studies presents two potentially meaningful conclusions regarding the effectiveness of treatment on psychopathic sexual offenders. First, they conclude that sexual offender treatment does not appear to be effective in lowering serious recidivism rates for psychopaths to levels demonstrated by non-psychopaths. Second, while treated psychopaths' sexual recidivism rates relative to non-psychopaths' rates are variable, there are repeated indications that some psychopaths show the same sexual recidivism rates as non-psychopaths following treatment, whereas others do not. It should be noted that within this meta-analysis, the authors included studies that did not have untreated comparison groups. As such, no conclusions emerge concerning the degree to which psychopathic offenders benefit from sexual offender treatment, as the lack of comparison groups resulted in simple correlational findings rather than tests of significance between experimental conditions (Doren & Yates, 2008).

Hanson, Bourgon, Helmus, and Hodgson (2009) conducted a review of 22 studies examining over 6,000 offenders and found that those offenders within the treatment group demonstrated lower sexual recidivism rates (10.9%) than those in the comparison groups (19.2%). Another interesting finding is that recent treatment showed stronger treatment effects than older treatments, as the starting date for treatment ranged between 1965 and 1997. Through examining both adolescent and adult sexual offenders within this review, the

authors also identified similar overall treatment effects, with only minor differences in the general recidivism rates (Hanson et al., 2009).

The purpose of the present study is to conduct a comprehensive update research synthesis on sexual, general and violent recidivism variables and the effectiveness of adult male sexual offender treatment using the statistical technique of meta-analysis. Further, this meta-analysis aims to identify significant variables that may impact treatment effectiveness, examining studies from the 1970s onward to capture all relevant studies since CBT's inception within the field of sexual offender treatment. To the authors' knowledge, this is the first meta-analysis to examine disparate methods of treatment effectiveness where CBT is used exclusively to treat adult male sexual offenders.

Method

Data collection

This meta-analysis examines the relationship between treatment effectiveness and recidivism among adult male sexual offenders. An extensive literature search of the EbscoHOST database was conducted, encompassing a total of 29 electronic databases (e.g., PsycINFO, Medline; for details, see Appendix). Studies were selected using the search terms (sex*) AND (offend*) AND (treat*) AND (effect*) AND (recid*) NOT (child* OR adolesc* OR fem*). In addition, a time-frame delimiter of searching for articles published in 1970 or later was incorporated due to the inception of CBT within sexual offender treatment programs as early as 1970. The reference lists of the reviewed studies were also examined in order to identify any additional studies not found in the initial search. The researchers reviewed each study to determine whether or not it evaluated treatment effectiveness, defined as recidivism. The following exclusion criteria codes were utilized at the abstract level to eliminate studies that would not ultimately meet inclusion criteria at the full-text level: (a) NRS: Not Research, (b) NR: No Recidivism, (c) NE: Not English, (d) J: Adolescents, (e) F: Females, (f) DD: Developmentally Delayed, (g) TX: Issues with Treatment, (h) PSY: Not Psychotherapy, (i) SMI: Severely Mentally Ill and (j) RP: Repeat Data.

For a study to be included, it was required to define recidivism as violation of parole, readmittance to institutions, rearrest, reconviction, lapses in behavior (such as willfully and elaborately fantasizing about sexual offending or engaging in any sources of stimulation associated with sexual offending) or any combination of the aforementioned after treatment concluded. Recidivism rates were attained from a variety of sources, including probation, parole records and officer reports, public records (e.g., National Criminal Justice records, state and provincial records) and additional sources such as child protection records and self-reports. In order to successfully implement a rigorous methodology in the present meta-analysis, existing meta-analyses were reviewed with the aim of annotating their limitations and pitfalls. The following limitations of previous studies were noted: no use of a control or comparison group; inclusion of multiple sexual offender populations (e.g., females, males, adolescents, severely mentally ill, developmentally delayed); unspecified or widely varying definitions of recidivism; use of solely intention-to-treat or per-protocol analysis; and overlapping participant samples. As such, these were used to inform the inclusion and exclusion criteria.

Inclusion and exclusion criteria
Measures of treatment effectiveness

The studies must utilize treatments for adult male sexual offenders in either a community or an institutionalized setting and compare the sexual recidivism rates of a treated sexual offender sample with a comparison group of sexual offenders. Therefore, studies that report only general recidivism or violence recidivism are not eligible. Similar recidivism criteria

must be used for both the treatment and the comparison groups, and the recidivism rates must be reported for comparable follow-up periods. The sexual offender treatment programs must include at least 10 offenders (5 offenders per group) in the combined sample, and the programs must provide CBT treatment. Studies utilizing alternative therapeutic modalities (e.g., psychodynamic therapy, humanistic therapy, etc.) or various forms of medication or hormonal therapy are not eligible.

Research respondents

The studies must be comprised of only adult male sexual offenders (aged 18 to 75 years) as treatment and comparison participants. Studies that include female or adolescent sexual offenders are not eligible. Any studies which indicate that the participants suffered from significant mental health problems or were developmentally delayed are also ineligible.

Research design

The studies must apply a control or comparison group design. The control condition can consist of receiving standard treatment, being on a waiting list, participating in a treatment program that is not specific to sexual offenders or receiving no treatment. Studies that utilize random assignment, incidental assignment, initial group differences upon statistical review or matched subjects are eligible. However, studies that use matched subjects must match on criteria relevant to the particular goals of the present meta-analysis.

Cultural and linguistic range

The studies must be conducted in an English-speaking country and the data must be accounted for and reported in the English language. Given that the sexual offender population may vary culturally, the inclusion of sexual offender studies from other cultures could have introduced an unaccounted for source of variance and bias into the meta-analysis.

Time frame

The studies must be conducted from 1970 onwards. This criterion restricts the meta-analysis to only the most current studies, as well as the effectiveness studies surrounding CBT-based treatment that have contributed to the majority of the existent mainstream sexual offender literature.

Publication type

Published and unpublished studies are eligible for inclusion, including refereed and non-refereed journal articles, dissertations, theses and government reports. As the purpose of this meta-analysis is to provide an updated examination of the treatment effects of CBT-based sexual offender programs, all eligible studies are considered so qualified, irrespective of their current publication status.

Analytical method

Coding of the variables

A subject-specific manual was utilized to code the studies. The coding variables include bibliographic information (e.g., year and type of publication), sample descriptors (e.g., mean age, predominant race, treatment setting), research design descriptors (e.g., treatment condition, sample frequency data), nature of treatment descriptors (e.g., type and orientation of treatment) and dependent measure descriptors (recidivism data and source). While a large volume of variables were coded, only those evidencing enough variability were included in the analysis. In an effort to ensure interrater reliability, three graduate students with similar coding training evaluated the studies using a blind method of coding that followed the guidelines set forth by the manual.

Computation of the effect sizes

In order to calculate the effect sizes of the recidivism rates, the primary statistics used were the frequency or proportion data. In the

event that frequencies and proportions either were not reported or could not be estimated, the effect size could not be calculated and the study was excluded from the meta-analysis. Odds ratios were computed as effect sizes from the frequency and proportion data. However, odds ratios are asymmetric and have a complex standard error formula, so all odds ratios were converted to their natural log for analyses and then the results were converted back into odds ratios to facilitate better understanding. All effect sizes and analyses were calculated using the software program Comprehensive Meta-Analysis (Biostat, 2005).

Heterogeneity

In order to properly evaluate the study's homogeneity, the Q statistic was calculated. In addition, the statistical heterogeneity was measured using the I^2 statistic as an estimation of the variation across studies due to true heterogeneity rather than chance. I^2 values of 25% are considered low, while 50% is considered moderate and 75% is considered high (Higgins, Thompson, Deeks, & Altman, 2003). Statistical heterogeneity was identified from overall treatment effects of sexual, general and violent/combination recidivism. As various differences among treatment programs were considered to be a source of potential heterogeneity, a variety of moderator variables were assessed in an attempt to explain any excessive variation found within the random-effects models. If all the CBT-based sexual-offender treatments administered were similar in nature, a small between-treatments effect size and low levels of heterogeneity would be found.

Moderator analyses

In order to evaluate the outcome differences in recidivism between treatment settings, follow-up periods, CBT treatment features and decade of implementation, a moderator comparison analysis was warranted. The following moderator analyses of distal outcome differences were conducted: (a) institution versus community treatment settings, (b) short-term versus long-term follow-up, (c) programs that utilize relapse prevention versus programs that utilize a combination of CBT treatment features and (d) decade of implementation. The moderator analyses permitted two or more subgroups of studies to be compared. The mean effect size was calculated for each moderator, and a test of heterogeneity was then conducted to examine whether or not the effect sizes vary significantly from one another. Variation between moderators indicates a difference in recidivism rates across studies. Given the high likelihood of variability between and within each study included, all moderator analyses were conducted in a random-effects model that attributes a portion of the variability to factors other than sampling error.

The impact of these sources of heterogeneity was explored using moderator analyses for each overall effect size for sexual, general and violent/combination recidivism. The variables explored include the treatment mandate, epidemiology, treatment setting, decade of implementation, CBT treatment features, therapy form (group, individual or both) and follow-up period. However, these variables were only explored within grand mean effect sizes that evidence significant heterogeneity as a possible explanation of variation. Furthermore, only those variables that exhibit significant variation across the studies could be explored. Additionally, the possibility of publication bias was assessed through a funnel plot and tested for asymmetry using Duval and Tweedie's (2000) trim and fill procedure. Both classic and Orwin's fail-safe Ns (Orwin, 1983) were computed for each effect size to determine the number of studies that it would take to nullify the results found.

Interrater reliability

Overall, the researchers achieved an agreement of 90%. Cicchetti (1994) defines interrater concordance rates with the following ranges: (1) poor agreement is < .40, (2) fair agreement is .41 to .59, (3) good agreement is .60 to .74

and (4) excellent agreement is .75 to 1.00. The overall concordance rate achieved excellent agreement. When coding differences were present, researchers met and resolved discrepancies until final agreement was reached.

Results

Descriptive characteristics

A total of 12,811 sexual offenders participated in the 25 studies included in the meta-analysis (Table 1). The sexual offenders' mean age across studies is 37.69 years, with approximately 56% of the entire sample characterized as a *mix* of offense type, such as child molesters and pedophiles, exhibitionists, rapists and sexual offenders who committed sexual assault (Table 2). Most studies were conducted in the US, with others based in Canada, Australia and the United Kingdom (UK). Approximately one fourth contain unpublished data. While approximately one fifth were published in the 1990s, more than three quarters of the studies were published from the 2000s onward (Table 3). However, as the treatment characteristics demonstrate, the actual treatment implementation began much earlier for many of the programs.

Seventeen of the studies included were of institutional treatment programs, within either a prison or a hospital setting, and the remaining eight were conducted within community-based settings. These studies examine the effectiveness of CBT-based treatment programs for sexual offenders in reducing general sexual and violent/combination recidivism rates. As many studies report multiple types of recidivism, a total of 42 effect sizes were calculated. In addition, within-treatment changes were examined, including core treatment goals of sexual deviancy, offense responsibility, empathy and problem-solving; however, not enough data were present to analyze these proximal treatment variables.

The treatment programs vary in the type of CBT offered, including individual, group and a combination of the aforementioned treatment methods. Overall, the treatment time varies from 3 months to 3 years and the follow-up periods range from 9 months to over 10 years. Most of the institutionalized treatment programs recruited participants through mandated participation, but some utilized initial screening, including the evaluation of amenability to treatment. All the community-based studies were mandated as part of conditional release, and recruited participants through parole or probation officers (Table 4). Most of the studies utilize similar exclusion criteria, such as disqualifying any participant who denied having committed a sexual offense. In addition, many studies disqualified offenders who suffered from significant psychopathology. All the studies focus on adult male sexual offenders, and none include any females or adolescents.

The majority of the 25 studies included in this meta-analysis report various forms of recidivism, including general, sexual, violent or a combination. The studies also vary with respect to the manner in which recidivism is defined. Recidivism was recorded after an average follow-up period of five years, and is largely based on data gathered from official criminal police records. The most common definition of recidivism is reconviction, followed by a combination of conviction, arrest and charges, then rearrest and finally recharge alone. In one study, recidivism is defined loosely as *lapse* behavior (Table 5).

The sample sizes for the treatment and control groups range from six to 1,910. Approximately one sixth of the studies includes fewer than 100 offenders. Only one study is based on a randomized design, while four use matched subjects and the remaining 20 utilize incidental assignment. Intention-to-treat analysis is used in 10 studies, and the other 15 utilize per-protocol analysis to determine epidemiology of treatment. In addition, the therapists that administered the treatment in most of the studies were either trained for the specific intervention or trained in the

Table 1. Details of the studies included in the meta-analysis.

Study	Sample	Setting	Mandate	Epidemiology	Decade	Therapy form	CBT features	Follow-up (years)
Abracen, Looman, Ferguson, Harkins, and Mailloux (2011)	134	Institution	No	ITT	1990s	G/I	RP/RNR	>5
Aytes, Olsen, Zakrajsek, Murray, and Ireson (2001)	620	Community	Yes	ITT	1990s	G	RP	≤5
Beech et al. (2012)	413	Community	Yes	ITT	2000s	G	RP	≤5
Craissati, Falla, McClurg, and Beech (2002)	178	Community	NS	PPA	1990s	G	NS	≤5
Duwe and Goldman (2009)	3440	Institution	NS	ITT	1990s	G/I	RP/RNR	>5
Friendship, Mann, and Beech (2003)	2557	Institution	NS	ITT	1990s	G	RP	≤5
Hanson, Broom, and Stephenson (2004)	724	Community	Yes	ITT	1980s	G/I	RP	>5
Lee, Proeve, Lancaster, and Jackson (1996)	58	Community	NS	PPA	1990s	G	RP	≤5
Marques et al. (1994)	704	Institution	No	PPA	1990s	G/I	RP	>5
Marshall, Eccles, and Barbaree (1991)	44	Community	NS	PPA	1980s	G/I	NS	>5
McGrath, Cumming, Livingston, and Hoke (2003)	195	Institution	No	PPA	1990s	G	RP	>5
Mcguire (2000)	100	Institution	Yes	PPA	1990s	G	RP	≤5
Olver, Wong, and Nicholaichuk (2009)	754	Institution	No	ITT	1990s	G/I	RP/RNR	>5
Pérez (2008)*	161	Institution	NS	PPA	2000s	G/I	RP/RNR	≤5
Pérez and Jennings (2012)	159	Institution	NS	PPA	2000s	G/I	RP	>5
Procter (1996)	108	Community	Yes	ITT	1990s	G	RP	≤5
Quinsey, Khanna, and Malcolm (1998)	484	Institution	Yes	PPA	1980s	G/I	RP	≤5
Saum (2007)*	175	Institution	NS	PPA	1990s	NS	NS	NS
Scalora and Garbin (2003)	194	Institution	Mixed	PPA	1990s	G/I	RP	≤5
Schweitzer and Dwyer (2003)	445	Institution	No	PPA	1990s	G	RP	≤5
Seager, Jellicoe, and Dhaliwal (2004)	177	Institution	No	PPA	1990s	G	RP	≤5
Studer, Reddon, Roper, and Estrada (1996)	220	Institution	No	PPA	1990s	G	RP	≤5
Ternowski (2005)*	267	Institution	Yes	PPA	1990s	G/I	RP	>5
Turner, Bingham, and Andrasik (2000)	200	Community	Yes	ITT	1990s	G/I	NS	≤5
Zgoba and Levenson (2008)	300	Institution	Yes	ITT	1980s	NS	RP	>5

*Note. N = 25. *Study is a Dissertation. G = Group; I = Individual; ITT = Intention-to-Treat; No = Non-mandated; NS = Not Stated; PPA = Per-protocol Analysis; RP = Relapse Prevention; RNR = Risk-Need-Responsivity; Yes = Mandated.*

Table 2. Frequencies and percentages of offender mean age, type of offender and violence of index offense.

Coding variable and category	Frequency	%
Mean age		
Twenties	1	4
Thirties	10	40
Forties	7	28
No information available	7	28
Type of offender*		
Child molesters/pedophiles	2	8
Exhibitionists	1	4
Unspecified mix	2	8
Mix	14	56
No information available	6	24
Violence of index offense		
Predominantly violent	4	16
Predominantly nonviolent	4	16
Mixed sample	1	4
No information available	16	64

Note. *Individual comparisons may cover multiple categories.

Table 3. Frequencies and percentages for the general characteristics of the included studies ($N = 25$).

Coding variable and category	Frequency	%
Publication year		
1990s	5	20
2000 onward	20	80
Country		
US	11	44
Canada	8	32
UK	4	16
Australia	2	8
Publication type		
Journal article	22	88
Dissertation	3	12

model of therapy used that is specific to the population of participants.

Analysis of sexual recidivism
Scope and overall effect size

All odds ratios, confidence intervals and heterogeneity statistics were computed using Comprehensive Meta-Analysis (Biostat, 2005).

All values were kept at their original computation, accurate to the third decimal place, in order to facilitate a meaningful interpretation of the results. A total of 19 of the 25 studies report sexual recidivism rates and were analyzed for treatment effectiveness specific to sexual recidivism. The overall odds ratio for sexual recidivism is 0.639, with a 95% confidence interval ranging from 0.473 to 0.861

Table 4. Frequencies and percentages for the CBT treatment characteristics of the included studies ($N = 25$).

Coding variable and category	Frequency	%
Decade of implementation		
1980s	4	16
1990s	18	72
2000s	3	12
Treatment setting		
Institution	17	68
(prison, hospital)		
Community-based	8	32
(outpatient)		
Treatment form		
Group treatment only	11	44
Group and individual treatment	12	48
No information available	2	8
Treatment participation		
Mandated	10	40
Non-mandated (voluntary)	8	32
No information available	7	28
CBT treatment features		
Relapse prevention	20	80
Combination (relapse	2	8
prevention and RNR)		
No information available	3	12
Duration of treatment		
Less than 1 year	12	48
1 year	1	4
1.5 years	1	4
2 years	2	8
More than 2 years	3	12
No information available	6	24

Note. RNR = Risk-Need-Responsivity.

(Table 6 and Figure 1). Odds ratios are interpreted differently from many other forms of treatment effect sizes. Values greater than 1.0 illustrate an increase in recidivistic behavior and thus a decrease in treatment effectiveness, whereas values less than 1.0 indicate a decrease in recidivistic behavior and thus an increase in treatment effectiveness. Odds ratios near 1.0 demonstrate that there was no change in behavior and ultimately no treatment effect. Although the overall finding for sexual recidivism demonstrates that the treatment had a significant effect, it is important to look for significant variation in the size of the treatment effect across the studies.

Heterogeneity and moderator analysis

The heterogeneity is significant across these studies with a Q value of 67.39, $p < .01$. A Tau squared value of .258 estimates the observed variation between effect sizes. Given that the Q value is higher than the degrees of freedom (18), this suggests that a higher proportion of the variation is actual variation. These results are also confirmed by the I^2 value of 73.29%, which indicates a highly

Table 5. Methodological characteristics of the included studies ($N = 25$).

Coding variable and category	Frequency	%
Nature of the control group		
Treatment as usual	6	24
No treatment	19	76
Epidemiology		
Intention-to-treat	10	40
Per-protocol analysis	15	60
Type of reoffense*		
Sexual	19	45
General	12	28
Violent/combination	11	26
Follow-up period		
5 years or less	15	60
More than 5 years	10	40
Source of recidivism data*		
Public/state/national criminal justice records	1	4
Police records	21	84
Combination of sources	3	12
Definition of recidivism*		
Recharge	7	28
Rearrest	6	24
Reconviction	11	44
Lapsed behavior	1	4

Note. *Individual comparisons may cover multiple categories.

Table 6. Total mean effects of treatment for sexual, general and violent/combination recidivism.

Outcome	n	OR	CI$_{95\%}$	Q	TG[a]	Recidivism (%)
Sexual	19	0.639***	0.473–0.861	67.386***	11.18	13.16
General	12	0.811	0.645–1.019	29.904***	34.10	31.00
Violent/ combination	11	0.642**	0.446–0.925	46.655***	26.05	30.44

Note. **$p < .05$; ***$p < .005$;
[a]Estimated recidivism rate across all participants. CI$_{95\%} = 95\%$ confidence interval; $n =$ number of studies; $OR =$ mean odds ratio; $Q =$ test of homogeneity; $TG =$ treated group.

moderate amount of real, observed variation. Given the significant heterogeneity, moderator analyses were performed in an attempt to explain the variation in effect sizes.

The variables explored in relation to the variability evident among the studies include the follow-up period, CBT treatment features, epidemiology, therapy form (group, individual or both), treatment mandate, treatment setting and decade of implementation. There are significant differences in the effect size of the studies based on the decade of implementation, $Q_{between}$ (2) $= 7.68$, $p = .021$. The two studies that employed treatment in the 1980s achieved an effect size of 1.07 and do not evidence a significant effect of treatment,
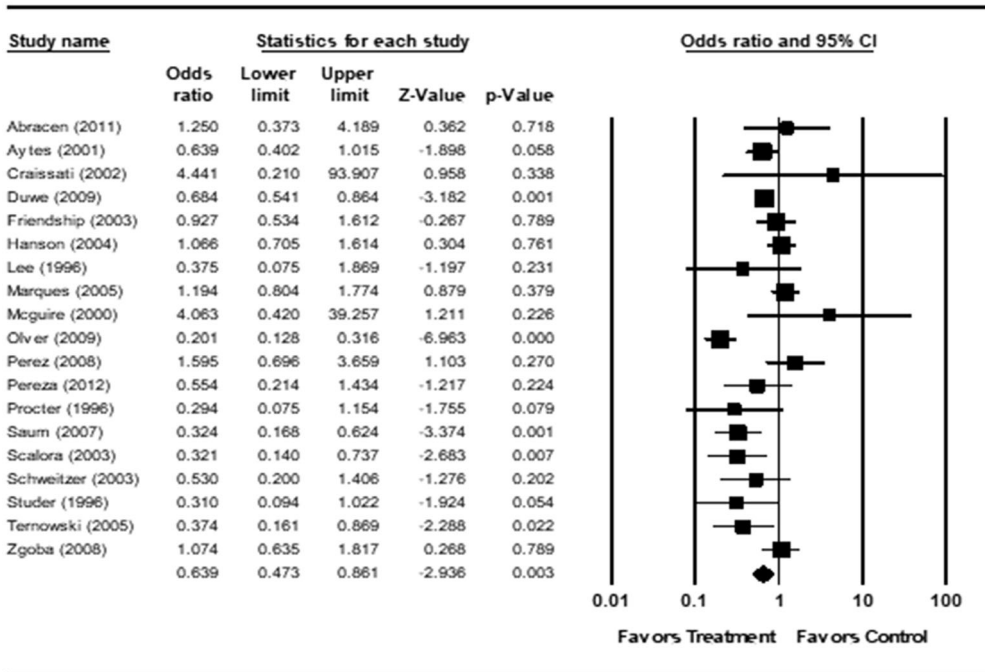
Sexual Recidivism

Study name	Odds ratio	Lower limit	Upper limit	Z-Value	p-Value
Abracen (2011)	1.250	0.373	4.189	0.362	0.718
Aytes (2001)	0.639	0.402	1.015	-1.898	0.058
Craissati (2002)	4.441	0.210	93.907	0.958	0.338
Duwe (2009)	0.684	0.541	0.864	-3.182	0.001
Friendship (2003)	0.927	0.534	1.612	-0.267	0.789
Hanson (2004)	1.066	0.705	1.614	0.304	0.761
Lee (1996)	0.375	0.075	1.869	-1.197	0.231
Marques (2005)	1.194	0.804	1.774	0.879	0.379
Mcguire (2000)	4.063	0.420	39.257	1.211	0.226
Olver (2009)	0.201	0.128	0.316	-6.963	0.000
Perez (2008)	1.595	0.696	3.659	1.103	0.270
Pereza (2012)	0.554	0.214	1.434	-1.217	0.224
Procter (1996)	0.294	0.075	1.154	-1.755	0.079
Saum (2007)	0.324	0.168	0.624	-3.374	0.001
Scalora (2003)	0.321	0.140	0.737	-2.683	0.007
Schweitzer (2003)	0.530	0.200	1.406	-1.276	0.202
Studer (1996)	0.310	0.094	1.022	-1.924	0.054
Ternowski (2005)	0.374	0.161	0.869	-2.288	0.022
Zgoba (2008)	1.074	0.635	1.817	0.268	0.789
	0.639	0.473	0.861	-2.936	0.003

Odds ratio and 95% CI

Favors Treatment   Favors Control

Figure 1. Odds ratio forest plot for sexual recidivism rates of treatment versus control.

$Z = 0.404$, $p = .69$. Similarly, the two studies that employed treatment in the 2000s achieved an effect size of nearly 1.0 and do not evidence a significant treatment effect either, $OR = 0.97$, $Z = -0.07$, $p = .95$. The studies that employed treatment in the 1990s show considerable variability in their effect sizes, Q_{1990} (15) = 52.99, $p < .01$. Thus, the treatment programs implemented during the 1990s were much more effective than those implemented in the 1980s and 2000s, although the 1990s studies still vary significantly in their effectiveness. The remaining moderator analyses show no other statistically significant differences (Table 7).

Publication bias

Duval and Tweedie's (2000) trim and fill procedure suggests that no studies need to be trimmed from the analysis in order to create a less biased result. Additionally, a classic fail-safe N (Orwin, 1983) of 118 studies would

need to be found in order to reduce the reported mean effect size to an insignificant level. Finally, using the more conservative Orwin's fail-safe N (Orwin, 1983), a total of 52 studies would raise the odds ratio to over 0.90.

Analysis of general recidivism

Scope and overall effect size

Of the 25 studies, 12 report general recidivism rates and were analyzed for treatment effectiveness specific to general recidivism. The overall effect size for general recidivism is 0.811, with a 95% confidence interval ranging from 0.645 to 1.019 (Table 6 and Figure 2). While this does not evidence an overall significant effect of treatment, there is significant variation in the size of the treatment effect from one study to the next. This variability may be explained by differences in the studies, which can be examined through moderator analyses.

Table 7. Homogeneity statistics for sexual, general and violent/combination recidivism.

Variable	Homogeneity within all groups			Homogeneity among all groups		
	Q_w	df	p	Q_b	df	p
Sexual recidivism						
Treatment mandate	54.73	11	.000	0.07	1	.794
Epidemiology	67.28	17	.000	0.07	1	.798
Treatment setting	65.82	17	.000	0.24	1	.626
Decade of implementation	55.68	16	.000	7.68	2	.021
CBT features	54.79	15	.000	0.01	1	.907
Therapy form	59.50	15	.000	0.05	1	.826
Follow-up period	62.35	16	.000	0.01	1	.917
General recidivism						
Treatment mandate	23.84	6	.001	1.12	1	.290
Epidemiology	29.59	10	.001	0.33	1	.564
Treatment setting	28.31	10	.002	1.46	1	.226
Decade of implementation	28.29	9	.001	1.13	2	.568
CBT features	25.47	9	.002	0.73	1	.393
Violent/combination recidivism						
Treatment mandate	35.76	6	.000	0.97	1	.324
Epidemiology	46.51	9	.000	0.80	1	.373
Treatment setting	46.37	9	.000	0.10	1	.756
Decade of implementation	31.20	8	.000	7.45	1	.006
Therapy form	37.74	9	.000	2.15	1	.143
Follow-up period	45.94	9	.000	0.09	1	.761

Note. df = degrees of freedom; p = error probability; Q_b = omnibus test of homogeneity between categories; Q_w = test of homogeneity within all studies.

Heterogeneity and moderator analysis

The heterogeneity is significant across the studies, with a Q value of 29.91, $p < .05$. The variance in the true effect sizes is estimated at a Tau squared value of .080. Since the Q value is greater than the degrees of freedom (11), this indicates that a higher proportion of the variation is assumed to be actual variation. This is further confirmed by the I^2 value of 63.22%, demonstrating there to be a moderate amount of real, observed variation.

The variables explored in relation to the variability evident among the studies include the treatment mandate, epidemiology, treatment setting, decade of implementation and CBT treatment features. There are no significant differences in the effect sizes of the studies based on the CBT treatment features, $Q_{between}$ (1) = 0.73, $p = .39$. The nine studies employing relapse prevention achieved a significant effect size of 0.74, $Z = -2.07, p = .04$, whereas the two studies using a combination of relapse prevention and risk–need–responsivity (RNR) have an effect size of nearly 1.00 and do not evidence a significant effect of treatment, OR = .96, $Z = -0.13$, $p = .90$. However, the studies employing just relapse prevention demonstrate considerable variability in their effect sizes, $Q_{relapse\_prevention}$ (8) = 25.42, $p = .001$. No other statistically significant differences were found among the remaining moderator analyses (Table 7).
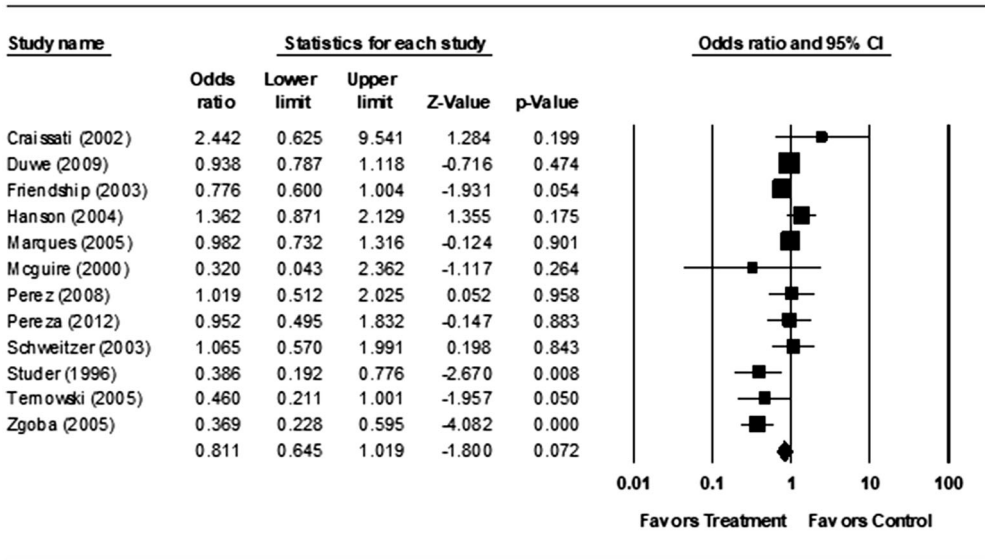
General Recidivism

Study name	Statistics for each study					Odds ratio and 95% CI
	Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	
Craissati (2002)	2.442	0.625	9.541	1.284	0.199	
Duwe (2009)	0.938	0.787	1.118	-0.716	0.474	
Friendship (2003)	0.776	0.600	1.004	-1.931	0.054	
Hanson (2004)	1.362	0.871	2.129	1.355	0.175	
Marques (2005)	0.982	0.732	1.316	-0.124	0.901	
Mcguire (2000)	0.320	0.043	2.362	-1.117	0.264	
Perez (2008)	1.019	0.512	2.025	0.052	0.958	
Pereza (2012)	0.952	0.495	1.832	-0.147	0.883	
Schweitzer (2003)	1.065	0.570	1.991	0.198	0.843	
Studer (1996)	0.386	0.192	0.776	-2.670	0.008	
Temowski (2005)	0.460	0.211	1.001	-1.957	0.050	
Zgoba (2005)	0.369	0.228	0.595	-4.082	0.000	
	0.811	0.645	1.019	-1.800	0.072	

Favors Treatment   Favors Control

Figure 2. Odds ratio forest plot for general recidivism rates of treatment versus control.

Publication bias

Duval and Tweedie's (2000) trim and fill procedure revealed an adjusted point estimate of 0.811, suggesting that no studies needed to be trimmed from the analysis. As a result, a classic fail-safe N (Orwin, 1983) of 14 studies would need to be found in order to reduce the reported mean effect size to an insignificant level. In addition, if setting the criterion for a trivial odds ratio to 0.90, Orwin's fail-safe N (Orwin, 1983) suggests that a total of five studies would raise the odds ratio over 0.90.

Analysis of violent/combination recidivism

Scope and overall effect size

Of the 25 studies, a total of 11 report violent/combination recidivism rates and were analyzed for treatment effectiveness specific to violent/combination recidivism. The overall effect size for violent/combination recidivism is 0.642, with a 95% confidence interval ranging from 0.446 to 0.925 (Table 6 and Figure 3). As this evidences an overall significant effect for treatment, assessment of both heterogeneity and moderator analyses were undertaken.

Heterogeneity and moderator analysis

The highest degree of heterogeneity is evidenced in this analysis. The heterogeneity is statistically significant across these studies, with a Q value of 46.67, $p < .01$. In addition, since the Q value is higher than the degrees of freedom (10), this suggests that a higher proportion of the variation is real variation. Finally, a Tau squared of .233 and an I^2 value of 78.57% further confirm the high amount of real, observed variation that is present.

Six moderator analyses were undertaken in an attempt to explain the variation in the effect sizes. The variables explored for the variability evident among the studies include the follow-up period, epidemiology, therapy form (group, individual or both), treatment mandate, treatment setting and decade of implementation. Significant differences were found in the effect size of the studies based on the decade of implementation, $Q_{between}$ (1) = 7.45, $p = .006$. The three studies that employed treatment in the 1980s achieved an effect size of 1.83 and do not evidence a significant effect of treatment, $Z = 0.927$, $p = .354$. On the other hand, the seven studies that employed treatment in

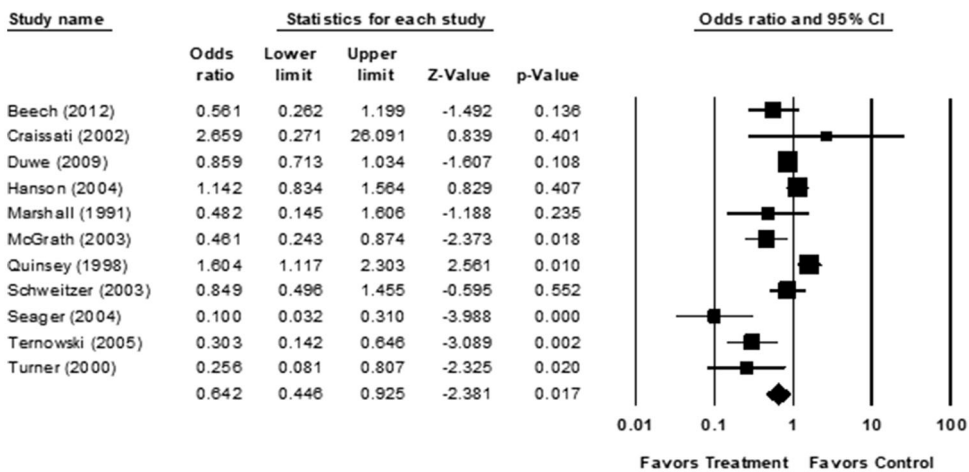## Violent/Combination Recidivism

Study name	Odds ratio	Lower limit	Upper limit	Z-Value	p-Value
Beech (2012)	0.561	0.262	1.199	-1.492	0.136
Craissati (2002)	2.659	0.271	26.091	0.839	0.401
Duwe (2009)	0.859	0.713	1.034	-1.607	0.108
Hanson (2004)	1.142	0.834	1.564	0.829	0.407
Marshall (1991)	0.482	0.145	1.606	-1.188	0.235
McGrath (2003)	0.461	0.243	0.874	-2.373	0.018
Quinsey (1998)	1.604	1.117	2.303	2.561	0.010
Schweitzer (2003)	0.849	0.496	1.455	-0.595	0.552
Seager (2004)	0.100	0.032	0.310	-3.988	0.000
Ternowski (2005)	0.303	0.142	0.646	-3.089	0.002
Turner (2000)	0.256	0.081	0.807	-2.325	0.020
	0.642	0.446	0.925	-2.381	0.017

Figure 3. Odds ratio forest plot for violent/combination recidivism rates of treatment versus control.

the 1990s achieved an effect size of 0.81 and do evidence a significant treatment effect, $Z = -2.722$, $p = .006$. Thus, the treatment programs implemented in the 1990s were much more effective than those implemented in the 1980s. The remaining moderator analyses show no statistically significant differences (Table 7).

Publication bias

Duval and Tweedie's (2000) trim and fill analysis revealed two studies that needed to be trimmed and filled to the right of the mean, resulting in an adjusted point estimate of 0.778 from an observed estimate of 0.642. In order to reduce the reported effect size to insignificance, a classic fail-safe N (Orwin, 1983) of 30 studies would be necessary. However, Orwin's fail-safe N (Orwin, 1983) suggests that a total of four studies would be necessary to raise the odds ratio to over 0.90.

Discussion

This meta-analysis has found support for the proposition that sexual offender CBT treatment programs are an effective method of reducing recidivism. Overall, the results of the analyses demonstrate that CBT programs are effective in reducing sexual and violent/combination recidivism behaviors post-treatment. When further analyzing the variability among the studies, the findings show the effect of the treatment employed during the 1990s as significant, suggesting that the programs delivered during this time period were slightly more effective than those delivered during the 1980s and 2000s.

Interestingly, these results are supported by several previous meta-analyses which found that treated sexual offenders exhibit lower levels of sexual recidivism (Gallagher et al., 1999; Hanson, 2009; Hanson et al., 2002; Lösel & Schmucker, 2005; Polizzi et al., 1999). The findings of the current meta-analysis concerning sexual recidivism bode well for these treatment programs' goals; specifically, many programs are structured to focus on the prevention of the sexual reoffenses that are particular to the individuals' previous sexual offenses, and this is the purpose of their referral to treatment.

On the other hand, the present meta-analysis found no difference based on treatment for general recidivism rates (i.e., the treated and untreated offenders have similar general recidivism rates). These results are also supported by the early findings of the sexual offender treatment effectiveness research conducted by Hanson and Bussière (1998) and Hanson and Morton-Bourgon (2005), who found that sexual offenders are more likely to reoffend by committing non-sexual rather than sexual offenses. These findings concerning general recidivism are not surprising, given that general reoffense is not a focus within most treatment programs.

As part of the moderator analyses of general recidivism, relapse prevention was not found to be a significant feature of CBT treatment. However, some of the variability could explain why the treatment programs utilizing relapse prevention (either as a framework or a module of treatment) were found to be more effective than those utilizing a combination of relapse prevention and RNR. While not significantly different, it makes sense that there is a difference between these two types of programs, since relapse prevention focuses on identifying potential high-risk behaviors upon release and creating an individualized plan to prevent instances of relapse, whereas the added RNR framework also incorporates a focus on offenders' risk levels, criminogenic needs and responsivity factors. These RNR factors are also tailored specifically to the individual offender; thus, offenders who are considered at high risk for reoffense participate in a more intensive management program than those considered low risk. It is possible that there may be differing benefits to treatment (e.g., individual offender level, treatment level) that employs a relapse prevention module or framework compared to one that combines relapse prevention with an RNR framework. Further research exploring these potential benefits is certainly warranted, given that many of the current CBT

treatment programs that are offered utilize both sets of frameworks.

Unique to the 1990s was a significant increase in the development of treatment programs worldwide, as well as an increase in interest in conducting and publishing more research in the field. Interestingly this is evidenced in the present meta-analysis, as many of the studies that administered treatment during this decade included evaluated treatment programs. The treatment techniques employed throughout this period were also advancing with regard to the reformulation of relapse prevention, which ultimately enabled programs to recognize that offenders have disparate issues and treatment needs (Hudson, Ward, & McCormack, 1999). This decade was also critical to the treatment history of sexual offenders, as interest began to rise in creating treatment programs that meet offenders' needs as well as increasing treatment effectiveness. Also, within the 1990s federal funding was remarkably abundant, as each US jurisdiction was successful in enacting registration and community notification laws (Logan, 2010). As a result, it is important to consider these factors as possible reasons for the higher level of treatment effectiveness in the 1990s. At the turn of the century, there was a rising interest in qualitative approaches to treatment research. Furthermore, the 2000s began with an increased focus on the implementation of strength-based models of treatment wherein varying degrees of research on effectiveness currently exist. Schwartz (2008) comments that the administration at the time eliminated funding for the Center for Sex Offender Management, which is the division of the Department of Justice (DoJ) dedicated to training jurisdictions on how to effectively manage the sexual offender population. In addition, with the federal implementation of the Adam Walsh Act in 2006, the administration held that if any jurisdiction failed to implement the act, funding for that jurisdiction would be surrendered (Logan, 2010).

It is suggested that the present results are generalizable to adult male sexual offenders ranging in age from 18 to 75 years and based in English-speaking countries who are receiving treatment in either institutional or community-based settings. In addition, these results can be generalized to most sexual offender populations receiving treatment, as most of the studies included in this meta-analysis excluded offenders who evidenced significant intellectual disability or severe psychopathology. Overall, these effect sizes are also generalizable to CBT programs currently implemented in English-speaking countries under both mandated and voluntary conditions. It is important to note, however, that a few studies define some variables differently. For example, one study includes *lapse in behavior* as a definition for general recidivism, which may contribute to a less conservative (possible overestimation) measure of recidivism behaviors.

These results should still be interpreted cautiously however, as approximately 40% of the included studies employ the use of the intention-to-treat method for epidemiology. Consequently, these studies include dropouts (if any are noted) within the treatment group, which could contribute to a possible underestimation of the treatment effect. This treatment effect is likely an underestimation and difficult to interpret, given that the dropouts did not fully complete the program and were thus less likely to benefit from treatment. On the other hand, approximately 60% of the included studies employed the use of the per-protocol analysis method for epidemiology, wherein dropouts are excluded from treatment groups in the analysis, which can contribute to a possible overestimation of the treatment effect. Thus, the actual treatment effect is likely balanced out due to the use of both of these epidemiological methods. While the studies included in this meta-analysis vary considerably with high heterogeneity across general, sexual and violent/combination analyses, the research designs are generally considered strong. As required

for inclusion, the studies must employ both a treatment and control or comparison group for analysis. Additionally, a random-effects model was utilized for all analyses, as this model is most appropriate due to the inherent variability across the treatment programs. This model accurately portrays the treatment effects by attributing a more appropriate weight to larger and smaller studies than would be the case had a fixed-effects model been chosen.

Limitations

Several limitations of this meta-analysis should be noted. In order to maintain an acceptable level of rigor, only studies that employed both a treatment and a control or comparison group were considered for inclusion. Without a control or comparison group, treatment findings are ultimately rendered less meaningful. In addition, only adult male sexual offenders are included, limiting overall generalizability specific to the sexual offender population. However, past research demonstrates that it is necessary to investigate female sexual offenders separately, as they evidence disparate treatment needs that do not generalize well if these analyses are combined (Faller 1987, 1995). The same issues arise for adolescent and developmentally delayed sexual offender populations. Any definition of recidivism that is not specified was included as missing data, and multiple categories of recidivism definitions were employed within the coding manual in order to capture the most accurate definitions utilized. In terms of epidemiology, either intention-to-treat or per-protocol analysis was utilized. Finally, any studies that were considered to have overlapping participant samples were further examined; studies with the highest participant number of those that overlapped were included, and those with lower percentages were excluded.

Of the 25 studies included, a few contain unclear information or missing data that may have impacted the results. Certain codes had

to be estimated based on a range provided or denoted as missing data when the information was not stated, which may have impacted the overall treatment effect. For example, two studies do not specify the type of recidivism measured and were included as unknown (missing data) within the violent/combination recidivism category. An example of unclear information is that of a study not explicitly stating the decade of implementation; thus, it is necessary to make an educated guess based on the study's publication year, the duration of the treatment and the length of the data collection. Inferring codes was only employed when multiple sources of information within the study supported an educated guess; however, there still exists the possibility for human error. The blind coding and interrater reliability process helped control for and mitigate this limitation.

Publication bias findings also revealed particularly low fail-safe *N* values for both sexual and violent/comparison recidivism rates, suggesting that a few studies with poor effect sizes could potentially overturn the results found. Given that the present meta-analysis included 25 studies, the likelihood of finding a few additional studies is possible. As a result, studies of this nature with potentially low effect sizes could lower the effect size to trivial proportions, thus lessening the treatment effect. Finally, due to studies' different conceptualizations of violent recidivism rates, as well as the fact that some studies combine violent recidivism with other forms, it was necessary to combine these rates for the final analysis. As a result, the conclusions from the violent/combination category are somewhat limited, as it is difficult to separate violent recidivism treatment effects from combined effects.

Treatment implications

There are several implications for treatment programs based on the results of this meta-analysis, which suggest that the CBT treatment administered during the 1990s was more effective for offenders who engaged in sexual and violent/combination recidivism behaviors. Due to the small sample of studies included, the results certainly warrant further investigation into aspects of the treatments that were administered throughout the 1990s. Of considerable interest are reformulations of relapse prevention, as most of the programs examined in this meta-analysis incorporated relapse prevention or a combination of relapse prevention and RNR principles as features of treatment. It could be that much greater emphasis was placed on relapse prevention during this period, as well as on efforts to improve this feature of CBT treatment. As there was a surge of research interest and program development worldwide during the 1990s, it is important to analyze studies from this period in isolation, in order to determine if their programs can stand alone with significant treatment effects. If so, this could provide valuable information and insight into aspects of the treatments administered that were unique to this period in the history of sexual offender treatment.

Future research

In order to expand upon the existing literature on sexual offender treatment effectiveness, it is imperative to explore multiple measures of recidivism that are investigated within the available studies. While sexual recidivism is most often investigated, as these offenses directly align with the focus of most treatment programs, it would be especially interesting to explore treatment effectiveness associated with general recidivism. Currently, the majority of research findings support a reduction in sexual offense recidivism post-treatment. Similarly, there is support demonstrating a greater reduction in sexual offenses rather than non-sexual offenses (Hanson & Bussière, 1998; Hanson & Morton-Bourgon, 2005). As the treatment effectiveness results currently indicate general recidivism to be more problematic post-treatment than sexual recidivism, further research isolating general recidivism which provides greater detail regarding the

types of offense that are most likely to be committed post-treatment would be helpful for determining the factors that might be associated with this particular type of recidivism.

As relapse prevention seems to be widely used either as a module or framework of CBT treatment programs, it would be helpful to explore this aspect further. Determining significant differences between using relapse prevention as a simple module of treatment versus an entire framework for a sexual offender treatment program could offer valuable information to assist treatment providers in better tailoring programs to individual offenders' specific needs. Also unique to treatment, offenders' within-treatment changes on variables such as empathy and sexual deviancy are important areas for future research. The available literature has been slow to produce rigorous findings that employ both treatment and control or comparison groups to assess these within-treatment changes. Exploration of proximal variables associated with core treatment targets (e.g., problem-solving ability, offense-supportive attitudes and sexual deviancy) could help to determine what works during treatment. Such information could further treatment providers' ability to appropriately tailor programs to meet individual offenders' needs, as well as to optimize treatment effectiveness. Future researchers are encouraged to employ the use of control or comparison groups, as similar current available literature is scarce.

When conducting future meta-analyses, there are a number of variables that are essential to include for an acceptable amount of rigor. Especially when measuring treatment effectiveness, it becomes important to have the ability to formulate meaningful interpretations across studies within this bed of literature. Some essential variables include: (a) the use of a control or comparison group, (b) multiple definitions of types of recidivism (e.g., sexual, general, violent), (c) specified definitions of recidivism (e.g., recharge, rearrest, reconviction), (d) specified population (e.g., males,

females, adolescents, developmentally delayed), (e) distal measures of treatment effectiveness (e.g., recidivism), (f) proximal measures of treatment effectiveness (e.g., core treatment targets such as empathy, sexual deviancy and offense responsibility) and (g) no overlapping participant samples.

Overall, the results of this meta-analysis suggest that CBT-based treatment programs implemented in English-speaking countries for adult male sexual offenders are effective in reducing sexual and violent/combination recidivism rates. As this analysis found no difference in treatment for general recidivism, further research isolating this type of recidivism is warranted. Also unique to this analysis is the finding that the treatments employed during the 1990s were more effective than those employed during the 1980s and 2000s. While this meta-analysis provides further support for the current sexual offender treatment effectiveness literature, more research is needed in order to effectively tailor programs to individual offenders' needs. Ultimately, determining within-treatment changes (empathy, problem-solving, etc.) can assist clinicians in making the necessary adjustments to continually reduce recidivism rates. Future researchers are strongly encouraged to explore within-treatment changes as a means of broadening this field's current traditional method of defining treatment effectiveness solely using recidivism.

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Ethical standards

Declaration of conflicts of interest

Jennifer L. Harrison has declared no conflicts of interest.

Siobhan K. O'Toole has declared no conflicts of interest.

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Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

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Appendix: List of All Databases Used in the Meta-Analysis

Academic Search Premier
AHFS Consumer Medication Information
Alt Health Watch
Business Source Complete
eBook Collection (EBSCOhost)
Education Research Complete
Education Resources Information Center (ERIC)
Funk & Wagnalls *New World Encyclopedia*
GreenFILE
Health and Psychosocial Instruments
Health Source Consumer Edition
Health Source Nursing/Academic Edition
LGBT Life with Full Text
Library, Information Science & Technology Abstracts
MAS Ultra-School Edition
MEDLINE with Full Text
Mental Measurements Yearbook with Tests in Print
Military & Government Collection
Newspaper Source
PEP Archive
Primary Search
PsycARTICLES
PsycBOOKS
PsycCRITIQUES
PsycEXTRA
PsycINFO
PsycTESTS
Regional Business News
SocINDEX with Full Text