Evidence-based treatments for juvenile sexual offenders: review and recommendations

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Abstract

Purpose – *Effective treatments for juvenile sexual offenders are needed to reduce the societal impact of sexual crimes. The purpose of this paper is to review the empirical literature on treatments for this clinical population.*

Design/methodology/approach – *The authors searched PsycInfo and MEDLINE (via PubMed) for studies that evaluated outcomes of treatments with juvenile sexual offenders.*

Findings – *There are a small but growing number of treatment studies (n = 10) with juvenile sexual offenders, and all of these studies evaluated cognitive-behavioral therapy or multisystemic therapy for problem sexual behaviors. The results of these studies are promising, although conclusions about treatment effectiveness have been frequently limited by methodological problems.*

Originality/value – *The authors provide recommendations for treatment providers and policymakers to consider in their decisions about interventions for juvenile sexual offenders. Furthermore, the authors offer suggestions for researchers who seek to develop effective interventions targeting this clinical population.*

Keywords *Literature review, Cognitive-behavioral therapy, Evidence-based treatment, Family systems therapy, Juvenile sexual offenders, Multisystemic therapy*

Paper type *Literature review*

Youths under the age of 18 years account for approximately 17 percent of all arrests for sexual crimes, not including prostitution (Federal Bureau of Investigation, 2014). This arrest statistic is particularly concerning when one considers that the ratio of self-reported to adjudicated sexual crimes by juveniles is approximately 12:1 (Lee *et al.*, 2012). Furthermore, there is evidence that many juvenile sexual offenders continue to be rearrested into adulthood for sexual (Hagan *et al.*, 2001) and nonsexual offenses (McCann and Lussier, 2008; Vandiver, 2006) and that up to half of all adult sexual offenders commit their first sexual offense during childhood or adolescence (Veneziano and Veneziano, 2002; Zolondek *et al.*, 2001). Thus, the development of effective treatment approaches for juveniles who sexually offend should be a priority for researchers and clinicians, given the potential public welfare benefits of preventing further criminality among these youths.

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Unfortunately, current public policies that attempt to manage juvenile sexual offenders' risk of future offending are often based on longstanding, erroneous assumptions about these youths. Indeed, research has shown that juvenile sexual offenders commit fewer crimes and are more responsive to treatment than is generally assumed (Chaffin, 2008) and have many of the same risk factors and developmental trajectories as juvenile nonsexual offenders (Ronis and Borduin, 2013). Nevertheless, federal and state policies have increasingly emphasized aggressive and

highly restrictive interventions for juvenile sexual offenders (e.g. community notification, sex offender registration, residential treatment) that have been modeled after policies for adult sexual offenders (Letourneau and Miner, 2005; Zimring, 2004). This is especially troubling because some researchers have argued that many current practices with sexually offending youths are likely to be ineffective (see Letourneau and Borduin, 2008; Seto and Lalumière, 2010) and may even increase rates of antisocial behavior when group treatment approaches are used (i.e. through deviancy training; see Dishion *et al.*, 1999).

In addition to the expansion of legislative responses to juvenile sexual offenders, there has been a proliferation of specialized treatment programs for these youths over the past several decades. In fact, a recent survey (McGrath *et al.*, 2010) identified over 700 outpatient and residential treatment programs for youths who commit sexual offenses. Although the authors noted that the use of "evidence-based practices" in these programs had increased during the prior decade, this was based on the subjective reports of program staff responding to the survey and was not verified using an objective standard. In light of recent estimates that only 5 percent of serious juvenile offenders receive an evidence-based treatment (Henggeler and Schoenwald, 2011), it seems unlikely that the vast majority of juveniles who commit sexual offenses are treated with empirically proven interventions. Furthermore, the general dearth of evidence-based practices for juvenile sexual offenders raises ethical concerns, given that treatment providers most often rely on untested and possibly harmful intervention methods with this vulnerable population of youths (Letourneau and Borduin, 2008).

In sum, there is a clear need to identify and promote the use of effective treatments for juvenile sexual offenders to reduce the societal impact of sexual crimes (i.e. on taxpayers and crime victims) as well as to improve the long-term adjustment of juvenile sexual offenders and their families. Therefore, a systematic literature review of evidence-based treatments for juvenile sexual offenders would help to inform policymakers and social service organizations in their decisions about interventions for this clinical population. In the present paper, we provide such a review and identify which treatments currently rest on a solid scientific foundation. We also present recommendations for the continued development and study of treatments for juvenile sexual offending.

Method

We conducted literature searches using PsycInfo and MEDLINE (via PubMed) to identify studies for inclusion in this review. In both databases, searches were performed for combinations of terms used to describe sexual offending behavior (e.g. "sex offender," "sexual offense," "problem sexual behavior (PSB)"), youth populations (e.g. adolescent, juvenile, parent, caregiver), and treatment (e.g. treatment, therapy, "clinical trial"); a full list of search terms is available from the first author upon request. Moreover, we examined the reference lists from previously published English language reviews of treatments for sexual offenders (e.g. Hanson *et al.*, 2002; Letourneau and Borduin, 2008; St. Amand *et al.*, 2008) to identify additional studies.

The first and third authors screened articles that were identified by the above search procedures using inclusive eligibility criteria. Specifically, studies were eligible if they included a psychosocial treatment (i.e. involving interpersonal interactions rather than medication) that targeted sexual offending or other PSB in a sample of juveniles (i.e. average age of less than 18 years old), a research design that included at least one comparison condition (randomization to conditions was not required), at least one measure that assessed rates of sexual offending behavior (via official records, self-report, or informant report) post-intervention, and a published report of the study available by January 1, 2015. Disagreements regarding inclusion criteria were discussed and resolved via consensus.

For all included studies, the first and third authors reviewed the study and recorded a range of characteristics relevant to participants, interventions, and study methods. Characteristics of study samples (i.e. target youths) included sample size, average age at baseline (in years), gender composition (percent female), racial/ethnic background (i.e. percent racial/ethnic minority), and sexual offense histories (i.e. number and severity of pretreatment arrests). Characteristics of

interventions included a description of the treatment condition (i.e. format and modality) and comparison condition (i.e. type of comparison, format and modality). Characteristics of study methods included method of group assignment (i.e. randomization, matching, or quasi-experimental), average length of follow-up (in years), and percentage of participant attrition from baseline to follow-up.

After study characteristics were coded, an effect size was calculated for the measure of post-treatment sexual offending behavior in each study. Specifically, Cohen's *d* (Cohen, 1988) was calculated with the Campbell Collaboration's effect size calculator (Wilson, 2001) using available statistical information. Cohen's *d* values represent the extent to which the treatment group differed from the comparison group in standard deviation units (i.e. the standardized mean difference). Effect sizes were calculated so that a positive number represents a beneficial effect for the treatment group relative to the comparison group. For example, $d = 0.25$ would indicate that the intervention group performed one quarter of a standard deviation better than the comparison group on a given outcome measure. For studies that contained multiple measures of sexual offending behavior, an effect size was calculated for each measure and these effect sizes were then averaged. Cohen's (1988) conventions were used to describe the size of each effect: 0.2 (small), 0.5 (medium), and 0.8 (large).

Results

The literature search yielded 1,621 studies to be reviewed for inclusion/exclusion. Ten of these studies (from eight samples) met inclusion criteria for the current review. Table I provides a list of these studies along with details about the participants, interventions, methods, and results of each study. Taken together, the studies represented a total of 989 youth participants and varied widely in sample size (range = 16 to 285, $M = 126.1$, $SD = 72.9$). Half of the studies ($n = 5$) were published since January 1, 2009. Eight studies were conducted in the USA, with the remaining two studies (Worling and Curwen, 2000; Worling *et al.*, 2010) conducted in Canada. In all but one study (i.e. Carpentier *et al.*, 2006), the vast majority of participants were male adolescents (average age = 13.8-15.5 years; percentage female = 0.0-6.1 percent); in Carpentier *et al.* (2006), the youths averaged 8.4 years of age and 38.6 percent were female. Samples were more diverse in terms of racial and ethnic minority representation (ranging from 16.5 to 54.0 percent minorities). Most studies required youths to have been adjudicated for at least one sexual offense, although Carpentier *et al.* (2006) focussed on nonadjudicated children with PSB and Gillis and Gass (2010) did not provide details on participants' arrest histories. Additional details on youths' sexual offending histories (e.g. number of previous arrests) were rarely provided.

All of the studies examined some form of cognitive-behavioral therapy (CBT; $n = 6$) or multisystemic therapy (MST) for PSB (MST-PSB; $n = 4$) as the primary treatment of interest; three of the four studies that evaluated MST-PSB also had a comparison group that received CBT. Comparison groups in the remaining studies were more variable but typically involved a combination of treatments offered through community-based providers, residential treatment facilities, or state-operated juvenile incarceration facilities. For group assignment, five of the studies used randomization procedures, one study used matching, and four studies used other quasi-experimental methods. Although the authors of each of the nonrandomized studies argued that their assignment procedures produced equivalent groups (i.e. on demographic characteristics and risk factors for sexual offending), it is well documented that lack of random assignment tends to result in overestimation of treatment effects (Kunz and Oxman, 1998). Thus, we give greater weight to the results of randomized trials in our subsequent discussion. Moreover, lengths of follow-up from the beginning of treatment (i.e. post-recruitment follow-up) varied widely (from 1.0 to 16.2 years). Finally, rates of attrition were mostly low (from 0 to 8 percent, with the exception of one study (Guarino-Ghezzi and Kimball, 1998) that excluded treatment dropouts from post-treatment assessments).

The following sections discuss the results of the ten studies identified in our literature review. These results are organized by the modality of the primary treatment under investigation, and are presented in the context of the clinical foundation of each treatment as well as the methodological quality of each study.

Table I Study characteristics and mean effect size values

Study	*Total n*	*Average age*	*% female*	*% racial/ ethnic minority*	*Sexual offense history*	*Treatment group*	*Comparison group*	*Method*	*Average follow-up length*	*Attrition rate (%)*	*Effect size[a] for sexual offending recidivism*
Borduin *et al.* (1990)	16	14.0	0.0	37.5	*M* = 1.75 offenses	MST-PSB; family- and community-based services	Individual therapy	Randomized	3.1 years	0.0	1.23
Borduin *et al.* (2009a)	48	14.0	4.2	27.1	*M* = 1.62 offenses	MST-PSB; family- and community-based services	Outpatient CBT; individual and group therapy	Randomized	8.9 years	0.0	0.89
Carpentier *et al.* (2006)	135	8.4	38.6	16.5	None; children with problem sexual behaviors	Outpatient CBT; child and parent group therapy	Outpatient play therapy; child and parent group therapy	Randomized	11.5 years	0.0	0.34
Gillis and Gass (2010)	285	13.8	0.0	34.7	NR; history of sexual offenses implied by setting	Wilderness/adventure group therapy	Non-specialized residential treatment or state-operated incarceration institutions	Matched	3.0 years	0.0	0.17
Guarino-Ghezzi and Kimball (1998)	75	NR; adolescents	0.0	38.7	28.4% had previous sexual offenses	Residential CBT; individual and group therapy	Non-specialized residential treatment for youth offenders	Assignment based on available space	12.0 years	22.7	n/a[b]
Lab *et al.* (1993)	155	14.5	2.0	43.2	All youth had at least one sexual offense	Outpatient CBT; group therapy, individual and family therapy as needed	State-operated incarceration institutions or referral to community providers for individual and group therapy	Assignment by level of risk (low/medium risk in treatment group, high risk in comparison group)	0.0-3.0 years; no average reported	0.0	0.33
Letourneau *et al.* (2009)	127	14.6	2.4	54.0	All youth had at least one sexual offense	MST-PSB; family- and community-based services	Outpatient CBT; group therapy, individual and family therapy as needed	Randomized	1.0 year postrecruitment	6.0	0.54

(continued)

Table I

Study	*Total n*	*Average age*	*% female*	*% racial/ ethnic minority*	*Sexual offense history*	*Treatment group*	*Comparison group*	*Method*	*Average follow-up length*	*Attrition rate (%)*	*Effect size[a] for sexual offending recidivism*
Letourneau *et al.* (2013)	124	14.7	0.0	54.0	All youth had at least one sexual offense	Same as Letourneau *et al.* (2009)	Same as Letourneau *et al.* (2009)	Randomized	2.0 years postrecruitment	8.0	0.15
Worling and Curwen (2000)	148	15.5	6.1	NR	All youth had at least one sexual offense	Outpatient CBT; individual, group, and family therapy	Adolescents who were receiving treatment elsewhere, refused treatment, dropped out before 12 months, or only received an assessment	Assignment based on whether participant completed 12 months of treatment in study	6.2 years postrecruitment	0.0	0.85
Worling *et al.* (2010)	148	15.5	6.1	NR	All youth had at least one sexual offense	Same as Worling and Curwen (2000)	Same as Worling and Curwen (2000)	Same as Worling and Curwen (2000)	16.2 years postrecruitment	0.0	0.63

Notes: MST-PSB, Multisystemic Therapy for Problem Sexual Behaviors; CBT, cognitive-behavioral therapy; NR, not reported. [a]Cohen's *d* (i.e. standardized mean difference between treatment and comparison group); [b]effect size could not be calculated for sexual offending recidivism because no participant in the treatment group was arrested for a sexual offense during the follow-up period

CBT

In the USA, CBT is the most common modality employed by community and residential treatment programs for juvenile sexual offenders: McGrath *et al.* (2010) found that 80.1 percent of programs for adolescents and 42.7 percent of programs for children reported a primary cognitive-behavioral orientation. CBT programs for juvenile sexual offenders differ widely in their specifics and include a number of "name-brand" treatments (e.g. Relapse Prevention; Becker and Kaplan, 1993). Nevertheless, the majority of CBT interventions focus on a core set of treatment targets that include each youth accepting full responsibility for his or her sexual offense(s), reducing or eliminating deviant cognitions about sexual behavior, learning new social skills (e.g. interpersonal skills, anger management), developing awareness and empathy for victims, engaging in behaviors and thoughts that prevent relapse, increasing family support networks, and reducing and controlling sexual arousal (McGrath *et al.*, 2010). Interventions are offered in community-based and/or residential settings and are primarily delivered in individual and/or group therapy sessions, although family sessions are frequently incorporated as well. In residential programs, interventions are delivered in the context of a therapeutic milieu.

Our literature search identified six studies (from five samples) that primarily investigated the effects of CBT for juvenile sexual offenders. In the first of these studies, Lab *et al.* (1993) compared a court-based CBT program to services as usual in the treatment of a large sample of juvenile sexual offenders ($n = 155$). Assignment to treatment groups was based on level of risk, with low- and medium-risk youths referred to the CBT program and high-risk youths referred to services as usual. The CBT program consisted of weekly 2.0-3.5 hour group sessions over a period of 20 weeks with supplemental individual and family sessions. Services as usual involved participation in community-based treatment programs or incarceration in detention facilities; these services did not offer programming that was specific to juvenile sexual offending. Although there was a small effect ($d = 0.33$) of the CBT condition on sexual recidivism rates, the difference between CBT and services as usual was not significant. The results of this study were further weakened by the assignment of lower-risk youths to the CBT condition relative to the usual services condition (thus confounding youth risk level with treatment group) and by a narrow assessment of sexual recidivism based on juvenile but not adult court records.

Guarino-Ghezzi and Kimball (1998) examined treatment outcomes for 75 youths with a history of at least one sexual offense. Youths were assigned by juvenile court personnel to one of 40 residential services programs; the assignments were based primarily on administrative considerations (e.g. available space in programs). Of the 40 programs, 27 were specialized for juvenile sexual offenders and typically involved group therapy sessions within a CBT relapse prevention framework; the 13 remaining programs were not specialized and provided psychoeducation (e.g. life skills, sex education) with limited discussion of sexual offending. On average, the nonspecialized programs also had significantly shorter lengths of stay than did the specialized programs. Results showed that youths who participated in the specialized programs (i.e. CBT) reported greater increases in social support and knowledge of relapse prevention strategies, as well as greater decreases in denial and deviant cognitions about sex, compared with youths in nonspecialized programs. Although these findings suggest that specialized residential programs using CBT may reduce risk factors associated with sexual offending, it is difficult to attribute these differences to program content because the youths were not randomly assigned to treatment conditions. Furthermore, the researchers only considered treatment completers in their evaluation of outcomes and did not include data from treatment dropouts ($n = 17$, or 22.7 percent attrition).

More recently, a pair of studies examined the effects of the Sexual Abuse: Family Education and Treatment (SAFE-T) program on a sample of 148 juvenile sexual offenders. Specifically, youths who completed at least 12 months of the SAFE-T program (i.e. approximately two months of assessment and ten months of therapy) were compared to a pooled group of youths who either dropped out of the program before 12 months, refused to participate in the program, received treatment elsewhere, or only received a pretreatment assessment. The SAFE-T program consisted of concurrent group, individual, and family therapies in a CBT relapse prevention

framework. For the two studies, data on criminal charges were obtained from the Canadian national registry of criminal arrests at 6.2 years (mean age = 21.5; Worling and Curwen, 2000) and 16.2 years post-recruitment (mean age = 31.5; Worling *et al.*, 2010), respectively. Significant reductions in sexual recidivism were found for the SAFE-T participants at both times of follow-up, with a large effect ($d = 0.85$) at 6.2 years and a medium effect ($d = 0.63$) at 16.2 years. These studies have a number of strengths, including the use of long follow-up periods and the collection of nationwide data on criminal recidivism. Nevertheless, the use of treatment dropouts and refusers in the comparison group is problematic because these youths likely had a worse prognosis than did those youths who completed the SAFE-T program.

Gillis and Gass (2010) used a matched group design to compare a CBT-based program (named Behavior Management Through Adventure: LEGACY) to residential/detention services in the treatment of 285 juvenile sexual offenders. Participation in this program involved placement for an average of one year in a residential community setting that featured wilderness/adventure programming (e.g. ropes courses, team-building exercises) and a therapeutic milieu based on a CBT model. Youths in the comparison condition were placed in either residential treatment programs or in state-operated youth detention facilities; these services were not specialized for the treatment of juvenile sexual offenders and did not involve wilderness/adventure programming or a CBT orientation. At a three-year follow-up using court records, there were no significant between-group differences in recidivism for sexual offenses ($d = 0.17$).

Carpentier *et al.* (2006) evaluated the efficacy of CBT with younger children (five to 12 years of age) who had exhibited PSB but had not been charged with sexual offenses. Participants ($n = 135$) were randomly assigned to CBT or play therapy and were tracked for post-treatment sexual offenses over an 11.5-year follow-up period. Both treatment conditions were manualized and involved separate, 60-minute weekly group meetings for children and caregivers over 12 weeks of treatment. The CBT groups were highly structured and focussed on psychoeducation, behavioral self-control techniques, and behavioral parent training; the play therapy groups were less structured and were based on client-centered and psychodynamic principles. The results showed that sexual offending rates for children who received CBT (2 percent arrested) were significantly lower than for children who received play therapy (10 percent arrested), with a small effect size ($d = 0.34$).

In sum, the current literature provides limited support for the effectiveness of CBT with juvenile sexual offenders. Most of the studies to date are limited by serious methodological limitations, such that interpretation of findings remains tenuous. The findings of Carpentier *et al.* (2006) seem most promising, although the effectiveness of their treatment approach with older youths charged with sexual offenses remains to be determined.

MST-PSB

MST (Henggeler and Borduin, 1990; Henggeler *et al.*, 2009) is a family- and community-based treatment model that integrates structural and strategic family therapies, behavioral parent training, and cognitive-behavioral interventions to reduce adolescent antisocial behavior. The adaptation of MST to the treatment of youths with sexual behavior problems is known as MST-PSB (Borduin *et al.*, 2009b). In general, the process of adapting MST to specialized clinical populations follows a treatment development framework that can take several decades to complete (see Henggeler *et al.*, 2009b). Consistent with that framework, the development of MST-PSB involved a series of three randomized clinical trials, including a pilot study (Borduin *et al.*, 1990), efficacy study (Borduin *et al.*, 2009a), and effectiveness study (Letourneau *et al.*, 2009, 2013). Although the treatment model was not referred to as MST-PSB at the time that these studies were published, all three trials involved specialized adaptations for juvenile sexual offenders and the latter two trials used earlier versions of the MST-PSB manual (Borduin *et al.*, 2009b) to guide training and supervision. Thus, all research on MST outcomes with juvenile sexual offenders provides information on the effectiveness of MST-PSB.

Like standard MST, MST-PSB specifies a model of service delivery rather than a manualized treatment with sequential session content. Nevertheless, to achieve strong specification, the

development and delivery of interventions in MST-PSB is based on nine treatment principles. Furthermore, MST-PSB therapists use several standard interventions at each level of the youth's social ecology, including individual (e.g. social skills training, cognitive restructuring of thoughts about offending), family (e.g. caregiver skills training, communication skills training, martial therapy), peer (e.g. developing of prosocial friendships, discouraging affiliation with delinquent and drug-using peers), and school levels (e.g. establishing of improved communication between caregivers and school personnel, promoting academic achievement). The overarching goals of MST-PSB are to empower caregivers (and other important adult figures) with the skills and resources needed to address the youth's PSB and other behavior problems. Services are delivered to youths and their caregivers in home, school, and neighborhood settings at times convenient to the family (including evenings and weekends), with intensity of treatment matched to clinical need. Client contact hours are typically higher in the initial weeks of treatment (three to four times per week if indicated) and taper off during a relatively brief (average five to seven months) course of treatment. Treatment fidelity in MST-PSB is maintained by weekly group supervision meetings involving three to four therapists and a clinical supervisor and is monitored by an MST-PSB expert using a rigorous quality assurance system.

Our literature search identified four studies (from three samples) that evaluated the effects of MST-PSB with juvenile sexual offenders. The first study (Borduin *et al.*, 1990) included 16 male juvenile sexual offenders who averaged 1.75 previous arrests for sexual crimes. The youths were randomly assigned to either MST-PSB (delivered by doctoral students in clinical psychology) or individual therapy (delivered by community-based mental health professionals). Interventions in the individual therapy condition involved an eclectic mix of psychodynamic, interpersonal, and cognitive-behavioral treatments; although the therapy in this condition is not consistent with current best practices in the treatment of juvenile sexual offenders, it was representative of the usual treatment in many judicial districts at that time (see National Adolescent Perpetrator Network, 1993). At 3.1 years following treatment, criminal conviction records showed that MST-PSB was more effective than individual therapy in reducing rates of rearrest for sexual crimes (12.5 vs 75.0 percent; $d = 1.23$) as well as nonsexual crimes. Although these findings were considered tentative due to the small sample size in the study, they suggested that MST-PSB was a promising treatment for juvenile sexual offenders.

A second randomized clinical trial (Borduin *et al.*, 2009a) evaluated the efficacy of MST-PSB vs usual community services (UCS) for juvenile sexual offenders, who averaged 1.62 arrests for sexual crimes. This trial improved upon the Borduin *et al.* (1990) trial by including a larger sample size ($n = 48$), a longer follow-up period (8.9 years), and a comparison treatment that was (and remains) more typical of services provided to juvenile sexual offenders in community settings (i.e. cognitive-behavioral individual and group therapy). MST-PSB was again delivered by doctoral students in clinical psychology, and treatment in the UCS condition was administered by juvenile court personnel. Results from multiagent assessment batteries conducted before and after treatment showed that MST-PSB was more effective than UCS in improving individual symptomatology, family relations, peer relations, and academic performance. Moreover, at follow-up, youths in the MST-PSB condition had 83 percent fewer convictions for sexual crimes than did UCS youth, with an average of 0.13 and 0.79 convictions in the respective conditions ($d = 0.89$). MST-PSB participants also had lower recidivism rates for nonsexual crimes and spent 80 percent fewer days incarcerated than did their counterparts who received UCS.

In the third and largest clinical trial ($n = 127$) of MST-PSB (Letourneau *et al.*, 2009), juvenile sexual offenders were randomized to MST-PSB or treatment as usual. Unlike the Borduin *et al.* (2009a) clinical trial, MST-PSB was delivered by therapists from a private provider agency (as opposed to graduate student therapists in a tightly controlled university setting). As in Borduin *et al.* (2009a), interventions in the treatment as usual condition involved cognitive-behavioral group therapy provided by a juvenile probation department. The results demonstrated that MST-PSB was more effective than treatment as usual in decreasing youths' deviant sexual interest/risk behaviors, delinquency, substance use, externalizing symptoms,

and costly out-of-home placements at a 12-month post-recruitment follow-up. More recently, Letourneau *et al.* (2013) found that the significant reductions in divergent sexual interests, sexual risk behaviors, delinquency, and out-of-home placements (but not substance abuse) for the MST-PSB group were maintained at a 24-month post-recruitment follow-up. Effect sizes for the measures of sexual behavior problems, averaged across youth and caregiver reports, were medium ($d = 0.54$) at the 12-month follow-up but negligible ($d = 0.15$) at the 24-month follow-up. Nevertheless, when accounting for baseline status, the effect of MST-PSB on sexual behavior problems remained significant across both follow-ups.

Taken together, the results of these three clinical trials support the capacity of MST-PSB to achieve favorable outcomes with juvenile sexual offenders. These clinical trials included some key methodological strengths, including random assignment to treatment conditions, long-term follow-ups of post-treatment sexual offending, and intent-to-treat analyses in which all youths were evaluated in the condition to which they were assigned. Furthermore, two of these trials provided direct comparisons of MST-PSB with CBT, which continues to be the most widely used treatment for juvenile sexual offenders (see McGrath *et al.*, 2010). Nevertheless, research to date on MST-PSB has been limited by the involvement of the developers in clinical and research operations of the studies. It will be important for independent groups of investigators to evaluate the effectiveness of the MST-PSB model. Furthermore, future evaluations of MST-PSB would be strengthened by the inclusion of comparison treatment conditions involving family therapy services, which are used by the majority of treatment providers for juvenile sexual offenders (see McGrath *et al.*, 2010) but have not been delivered to comparison youths in trials of MST-PSB to date.

Discussion

The results of this systematic review suggest that there is a wide gap between research and practice in the treatment of juvenile sexual offenders. Indeed, we identified only one randomized clinical trial that evaluated the effects of CBT on sexual offending in younger children and preadolescents (Carpentier *et al.*, 2006) and no randomized trials that evaluated CBT with adolescent (i.e. juvenile) sexual offenders. Although we did identify four nonrandomized trials of CBT with juvenile sexual offenders, only two of these trials supported the efficacy of CBT with this clinical population and all four had other serious methodological flaws besides nonrandom assignment of participants (e.g. exclusion of treatment dropouts from analysis, failure to examine sexual offenses in the adult criminal justice system). In contrast, MST-PSB has demonstrated significant effects on the recidivism of juvenile sexual offenders in three randomized clinical trials (including two direct comparisons to CBT) yet is much less widely used than CBT at present (McGrath *et al.*, 2010).

The relative effectiveness of MST-PSB in reducing criminal activity in juvenile sexual offenders has important implications regarding the design of treatment programs for such youths. First, the results of MST-PSB may be due in part to its explicit focus on addressing key social-ecological risk factors (e.g. ineffective parenting practices, family conflict, social skill and problem-solving deficits) that are related to PSB and place youths on a developmental pathway (or pathways) for sexual offending. That is, MST-PSB may be relatively effective because it targets important socialization processes that contribute to or maintain PSB. A major limitation of CBT for juvenile sexual offending may be its relatively narrow focus and failure to account for the multidetermined nature of PSB.

A second implication of our review for the design of treatment programs for juvenile sexual offenders is related to the accessibility and ecological validity of services. In family-and community-based treatments such as MST-PSB, interventions are delivered in community settings (e.g. home, school, recreation center) to promote family engagement, the development of comprehensive and effective safety and relapse prevention plans, and the acquisition of more accurate assessment data regarding problem behaviors and intervention effects. Conversely, CBT and other traditional services are typically delivered in settings (e.g. community-based clinics, residential treatment centers, juvenile justice institutions) that have little bearing on the contexts of youths' daily lives.

Third, the findings of this review suggest that interventions with an established evidence base in treating youth antisocial behavior hold promise in meeting the clinical needs of sexually offending youths. Indeed, research on risk factors for juvenile sexual offending (e.g. Ronis and Borduin, 2007; van Wijk *et al.*, 2005) shows that these risk factors are very similar to those observed for other types of serious antisocial behavior. Thus, the effectiveness of MST-PSB bodes well for adapting other evidence-based treatments of delinquency (e.g. Multidimensional Treatment Foster Care – Chamberlain, 2003; Functional Family Therapy – Alexander and Parsons, 1982) to the treatment of juvenile sexual offending, given similar clinical emphases (i.e. focus on key risk factors associated with delinquency, ecologically valid service delivery). Nevertheless, as described next, much remains to be learned about the effectiveness of treatments for juvenile sexual offenders.

Moderators and mediators of treatment effects

Within the small extant literature on treatment outcomes with juvenile sexual offenders, almost no research has examined for whom (i.e. moderation) or how (i.e. mediation) these treatments work. To date, researchers have only evaluated moderation and mediation of the clinical effects of MST-PSB. Regarding moderation, Letourneau *et al.* (2009) did not find significant moderating effects of victim age (i.e. child vs peer/adult victim) or level of perpetrator aggression (i.e. whether the crime required formal adjudication) on any outcomes, suggesting that treatment effects did not vary based on characteristics of the juveniles' sexual offenses. Regarding mediation of outcomes in the Letourneau *et al.* (2009) clinical trial, Henggeler *et al.* (2009) demonstrated that MST-PSB effects on youth antisocial behavior and deviant sexual interest/risk behaviors were mediated by increased caregiver discipline practices as well as decreased caregiver concern about the youth's antisocial peers. These findings are consistent with the MST theory of change (Henggeler *et al.*, 2009), which contends that increases in positive parenting behaviors (including caregiver-delivered peer interventions) are the primary drivers for reductions in youth antisocial behavior. Of course, independent replication of these findings is needed. Furthermore, future studies should investigate whether treatment outcomes are moderated by other characteristics of participants (e.g. gender, race/ethnicity, age) or interventions (e.g. number of sessions, individual vs group format) to improve our understanding of the conditions under which a given treatment is effective. Finally, researchers should examine the CBT theory of change, which proposes that modifying behavioral contingencies and/or deviant cognitions in the individual youth leads to decreases in sexual offending.

Economic costs and benefits of treatment

In recent years, interest in economic analysis of treatments for juvenile offenders in general has grown substantially (see Greenwood and Welsh, 2012). Although few researchers have investigated the economic costs and benefits of treatments for juvenile sexual offenders, one exception is a study by Aos *et al.* (2006) at the Washington State Institute for Public Policy that estimated the financial benefits of such treatments to taxpayers (i.e. reductions in expenses for police, court processing, and corrections) and crime victims (i.e. reductions in tangible and intangible losses). These researchers based their analysis on the pooled results of four different clinical trials with juvenile sexual offenders (Borduin *et al.*, 1990; Guarino-Ghezzi and Kimball, 1998; Lab *et al.*, 1993; Worling and Curwen, 2000); the net benefits of treatment were estimated at $7,829 per youth, resulting in a return of $1.24 for every dollar spent. These findings suggest that treatments for juvenile sexual offenders are capable of producing modest economic benefits.

Although encouraging, the Aos *et al.* (2006) findings are limited by the fact that the benefits were based on a pooled estimate of treatment effects across studies of CBT and MST-PSB. To address this limitation, Borduin and Dopp (2015) used an adapted version of the Aos *et al.* model to investigate the economics of MST-PSB vs CBT based on arrest data obtained in the 8.9-year follow-up of the Borduin *et al*. (2009a) clinical trial. The net benefits of MST-PSB over CBT were estimated at $343,455 per MST-PSB participant, with a return of $48.81 in savings to taxpayers and crime victims. These findings suggest that family-based treatments such as MST-PSB can produce lasting economic benefits and that treatments that are clinically

effective with juvenile sexual offenders may also be cost effective. It would be useful for future studies to examine the costs and benefits of other treatments for juvenile sexual offenders to more fully inform funding decisions about evidence-based treatments for this clinical population.

Conclusions

In summary, our review found consistent research support for the effectiveness of MST-PSB and limited support for the effectiveness of CBT with juvenile sexual offenders. However, the overall number of studies in this area is disappointingly low, with only four randomized trials to date. In order to develop and refine treatments for juvenile sexual offenders, additional research will be necessary across several areas of inquiry. First, studies that incorporate rigorous methodology (e.g. randomization to treatment conditions) should be used to evaluate the effectiveness of all treatments for juvenile sexual offenders. Second, researchers should seek to characterize the mechanisms of treatment effects, the conditions (e.g. age groups, severity of offending behavior) under which treatments are effective, and the economic costs and benefits of clinically effective treatments. Third, to demonstrate generalizability, the positive findings in studies of MST-PSB (or other evidence-based treatments) need to be replicated by independent groups of investigators who do not include the treatment developers. Relatedly, it would be beneficial for investigators outside of the USA and Canada to conduct more controlled evaluations of treatments for juvenile sexual offenders, given that treatment approaches with this population can vary considerably by country and that treatments developed in North America may need to be adapted for delivery in other cultures. Finally, and perhaps most importantly, there is considerable room for the development of additional evidence-based treatments for juvenile sexual offenders. We recommend that clinical scientists consider the comprehensive array of risk factors linked with PSB, as well as protective factors (i.e. individual, familial, and extrafamilial strengths), in the design of treatments for sexually offending youths. As more evidence-based treatments for juvenile sexual offenders are developed, strong partnerships will be necessary between researchers, treatment providers, and community stakeholders (e.g. juvenile justice, child welfare) to promote the transport, implementation, and dissemination of these treatments.

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