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**Why polygraph testing does not consistently lead to reduced recidivism for individuals
convicted of sexual offending**

Daisy N. Elvin ^a, Emily E. Little ^a, Jane L. Wood ^a, Theresa A. Gannon ^a,
Emma Alleyne ^a, & Caoilte Ó Ciardha ^{a†}

^aCentre of Research and Education in Forensic Psychology, School of Psychology,
University of Kent, UK

Address for Correspondence:

Dr Caoilte Ó Ciardha
School of Psychology,
Keynes College,
University of Kent,
Canterbury
CT2 7NP

E-Mail: C.C.OCiardha@kent.ac.uk

[†] Note to editors/copy-editors: The corresponding author's surname is Ó Ciardha. The Ó should not be mistaken for an initial.

Abstract

Polygraph examinations are commonly used to monitor individuals following conviction for a sexual offense. The objective of polygraph use is to elicit risk-relevant disclosures to inform and improve management of people who have offended sexually, with the ultimate aim of reducing the likelihood of reoffending. However, by synthesizing and evaluating the existing recidivism literature relating to post-conviction sexual offense-related testing (PCSOT), this narrative analysis demonstrates that use of PCSOT lacks robust empirical support beyond the fact that examinations facilitate increased disclosures and can be used as a surveillance tool. This review proposes mechanisms through which polygraphs would be expected to impact offending behavior and explores potential explanations for why PCSOT has not been found to reduce recidivism. It is suggested that polygraphs may undermine a trusting relationship and may be over-relied upon as a tool to tackle denial or determine risk categorization, instead of translating disclosures into individualized management. It is clear from this review that there is an urgent need for more rigorous research to assess the effectiveness of PCSOT in terms of treatment and recidivism outcomes, to inform policies that facilitate empirically driven clinical practice.

Keywords: polygraph, sexual offending, risk management, recidivism, denial, therapeutic alliance.

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Why polygraph testing does not consistently lead to reduced recidivism for individuals convicted of sexual offending

1. Introduction

The topic of sexual offending evokes high levels of concern from the general public, the media, and policymakers (Schmucker & Lösel, 2015), which has been reflected by a shift towards more punitive attitudes and sanctions, evidenced in a number of regions/countries including Europe, North America, Israel, and Japan (Ben-Shakhar, 2008; McAlinden, 2012). Despite sexual reoffending rates being considerably lower than public perception (Helmus et al., 2012), the negative consequences of these offenses motivate exceptional efforts to manage individuals convicted of sexual offending (Helmus et al., 2013). In some jurisdictions, these efforts include mandatory polygraph examinations—the measurement of physiological arousal hypothesized to signify deception (Nelson, 2014; Walczyk et al., 2018)—to assess compliance with license conditions (Cain, 2008).

Post-conviction sexual offense-related testing (PCSOT)¹ refers to the use of polygraph examinations to assist professionals when monitoring individuals convicted of sexual offenses. PCSOT was first introduced across the US in the mid-1960s (Abrams & Abrams, 1993) and the latest available survey—conducted over a decade ago—showed that PCSOT was utilized in almost 80% of adult and 50% of adolescent community programs (McGrath et al., 2010). Although initially taking a more cautious approach (Gannon et al., 2008), the UK is increasingly using polygraphs to supervise individuals convicted of sexual offenses on parole or probation (Meijer & Verschuere, 2010), but at this time, does not use the polygraph to aid treatment. From 2014, under

¹ The literature on this topic typically refers to *post-conviction sex offender testing*. We instead use the term *post-conviction sexual offense-related testing* to reflect the growing movement towards using person-first language to avoid labelling people who have offended by their offense (see Willis & Letourneau, 2018).

legislation introduced in the Offender Management Act (2007), polygraph examinations became a mandatory license condition across the UK. As a license condition, PCSOT is used to supervise adults assessed as posing the greatest risk of reoffending after serving at least a one-year custodial sentence for a sexual offense—approximately 25% of people on license for committing sexual offenses (Wilcox & Donathy, 2014). In contrast, PCSOT is rarely used elsewhere in the world (Grubin et al., 2019). Grubin et al. (2019) reported that PCSOT is used in less than 10% of Canadian treatment and supervision programs (McGrath et al., 2010), only occasionally reported in the Netherlands (Buschman et al., 2010; Sosnowski & Wilcox, 2001), and intermittently used by Russian researchers to explore sexual arousal patterns. Grubin et al. (2019) describe this as raising the “question of whether programs in the US and Britain are benefitting from a technique that is ignored elsewhere, or whether it is over-used and over-relied upon in those countries” (p. 141).

For the context of this review, PCSOT is used as an overarching term referring to a polygraph examination conducted and interpreted by a qualified polygrapher and required by a case manager or someone responsible for the treatment of an individual convicted of a sexual offence. We prefer the term *case manager* to other terms used in the literature (e.g., offender manager) to avoid the use of labelling language. Case managers are typically responsible for the person during their sentence, assessing the individual’s risks and needs, and deciding on necessary interventions. The specific role and title of a case manager in practice will vary depending on jurisdiction (for example, in the UK this is likely to be someone who works for a Probation trust or a police officer). Qualified polygraphers are typically required to register with a governing body such as the American Polygraph Association or British and European Polygraph Association, which provide training and oversees the conduct of its members by requiring adherence to a code of ethics and a set of standards and principles of practice, to ensure the use of evidence-based scientific methods (British Polygraph Academy, 2018).

PCSOT can be used with the aim of enhancing treatment delivery and/or for improving community supervision. In this review, we distinguish, where possible, between PCSOT used

within treatment (PCSOT-T) and PCSOT with a supervision (PCSOT-S) focus. In addition to these different aims, there are three major types of polygraph test used in PCSOT: the Sexual History Polygraph Examination (SHPE) which aims to gather a complete account of an individual's sexual history, fantasies, and previously undisclosed activities (Wilcox et al., 2005); the Instant Offense test (previously called the specific denial test) which focuses on elements of denial associated with allegations (Grubin, 2008); and Maintenance examinations which are conducted periodically to assess adherence to treatment or supervision conditions (Wilcox, 2000, 2009). SHPE and Maintenance examinations form the majority of PCSOT as a range of material can be covered (Grubin, 2008). The questions asked during PCSOT are determined by which type of test is being used but will always be tailored to the individual and there will typically be between eight and 12 questions with up to four target issues, agreed between case manager and polygrapher. The individual will be asked 'known truth' questions to gauge a truthful baseline and any questions asked should simply require a yes or no response and be as specific as possible. For example, in a SHPE the individual may be asked: 'have you ever engaged in sexual contact with someone who was asleep or unconscious?', for an Instant Offence: 'on or about 1st January 2021, did you engage in sexual contact with Jane Doe?', or during a Maintenance examination: 'since your last polygraph, have you been alone with anyone under the age of 18?' (Nelson, 2006).

Exactly how polygraph examinations are conducted, in terms of frequency of use and the consequences of any disclosures, will vary depending on the intended purpose (whether for PCSOT-T or PCSOT-S). In the US, PCSOT-T can be used to explore specific treatment issues, and disclosures may lead to modifications to treatment plans. During PCSOT-S (used in both the US and UK), individuals will be asked about behaviour relating to compliance with their supervision conditions, and disclosures may be used to increase/decrease supervision, but cannot be used to revoke supervision (Administrative Office of the United States Courts Probation and Pretrial Services [Courts Probation and Pretrial Services], 2016). It is generally recommended that compliance examinations, forming part of community supervision, should be conducted every six

months (UK National Offender Management Service [NOMS]²; Stalans 2004). As an example, in the UK, individuals with PCSOT-S as a mandatory license condition will typically be tested within 8-16 weeks after release and thereafter every six months. If an individual receives a ‘deception indicated’ result, the time before their next polygraph examination can be brought forward, and will usually take place three months after the last (NOMS, 2014). In the US, if an individual refuses to answer a question during the polygraph examination on the grounds that it is incriminating, the case manager must not attempt to force the individual to answer (Courts Probation and Pretrial Services, 2016). If there is uncertainty about whether the question may lead to incrimination, the case manager should refer the matter to court (Courts Probation and Pretrial Services, 2016). While procedures vary by jurisdiction, no action should be taken solely based on whether an individual ‘passes or fails’ a PCSOT (Grubin, 2008), and it has been reported that rather than being punished for disclosures, individuals are more likely to be rewarded with positive feedback for any progress they are making (Holden, 2000). When considering the impact of PCSOT, we will focus on the intended purpose of polygraph testing (PCSOT-T and PCSOT-S) rather than the type of test used (e.g., SHPE).

Research consistently provides evidence for a *polygraph as truth facilitator* effect (Grubin, 2003; Wilcox & Gray, 2012). For example, in a recent systematic review by Elliott and Vollm (2018), 19 studies from the US, UK, and Netherlands all established that PCSOT elicits a significant increase in disclosures relevant to the supervision of those who have committed sexual offenses compared to non-polygraphed participants. This has since been replicated in a large-scale study across the UK in which individuals convicted—or suspected—of sexual offending, undergoing either voluntary or mandatory polygraph testing by the police, in a range of settings, across all levels of risk, were more likely to reveal in-depth risk-relevant information, relative to comparisons not undergoing polygraph testing (Wood et al., 2020). Additionally, polygraphed

² Now renamed Her Majesty's Prison and Probation Service (HMPPS).

individuals, clinicians, and correctional staff self-report benefits from PCSOT (e.g., Spruin et al., 2018), which has been used to evidence the polygraph's utility and justify PCSOT (Levenson, 2009).

Evidently a strength of PCSOT is its ability to elicit more information than that obtained by an unassisted professional (Handler et al., 2013). However, Grubin et al. (2019) highlighted that it is unclear whether the benefit of PCSOT is limited to short-term management or whether it impacts the long-term behavior of individuals. A recent meta-analysis of psychological treatment for sexual offending (Gannon et al., 2019) found that treatment programs containing polygraph testing were associated with smaller treatment effects than programs without polygraph use. In Wood et al.'s (2020) evaluation, individuals convicted of sexual offending self-reported that the polygraph had little effect on their behavior. Although reoffending rates are considered the most important measure of rehabilitation (Spivak & Sharp, 2008), very few studies have examined the impact of PCSOT on reoffending. Recidivism research thus far, has failed to demonstrate that polygraph use significantly influences sexual recidivism, and has established only weak evidence suggesting moderate reductions in violent non-sexual recidivism (Elliott & Vollm, 2018). These findings appear at odds with the widely held view that disclosures are crucial for therapeutic progress (Farber, 2003; Farber & Hall, 2003). In this review we synthesize and evaluate the existing recidivism literature, and subsequently propose potential explanations for the disparity between the theory that PCSOT should reduce recidivism and the evidence that suggests otherwise.

2. A Model of PCSOT and Reoffending

To understand how PCSOT may impact on reoffending we need to hypothesize mechanisms through which we expect polygraph use to impact on offending behavior. This is essential to help navigate the mixed picture that emerges from the empirical literature. If PCSOT use reduces the incidence of sexual abuse in absolute terms, we suggest it may do so through psychological mechanisms such as those outlined below.

2.1. Deterrence

Proponents (e.g., Abrams, 1991; Abrams & Simmons, 2000; Blasingame, 1998; Cooley-Towell et al., 2000; Consigli, 2002; Heil & English, 2009) claim that PCSOT may function as a deterrent. This is related to the concept of *certainty of punishment* within Deterrence Theory, as a mechanism through which the criminal justice system may prevent crime (see Nagin, 2013). Specifically, the use of PCSOT-S as part of ongoing post-release supervision may increase the perceived certainty of punishment for people who would otherwise commit further offenses. Through this mechanism, PCSOT-S should result in a reduction in recidivism rates among individuals managed post-release using polygraph, compared to individuals supervised without polygraph testing, by influencing offending behavior through deterrence. Importantly, this relationship would be mediated by lack of confidence in getting away with any breaches or reoffending (Cota, 2014; Schultz, 2018).

2.2. Disclosure of Criminogenic Needs

Therapists evaluating and/or treating individuals convicted of sexual offending need reliable information about their clients' past and current sexual behaviors and interests (Abel & Rouleau, 1990), as these are empirically linked to reoffending risk (Rice et al., 1992; Serin et al., 2001). Without this knowledge, therapists cannot effectively identify the patient's precise treatment needs, and are less able to accurately manage risk (Collins, 2019; Wilcox & Madsen, 2009). PCSOT-T may impact on reoffending by providing clinicians with greater insight regarding the criminogenic treatment needs of a particular client (Salter, 1995; Witt & Neller, 2018). For example, an individual who has committed sexual offenses against children but who denies a sexual interest in children, may disclose pedo- or hebephilic interest as part of polygraph testing. It is therefore intuitive that increased disclosures, facilitated by PCSOT-T, should enhance a therapist's ability to address treatment needs, subsequently reducing reoffending (Witt & Neller, 2018). To impact on reoffending, disclosure would need to occur before or during treatment, and any effect on recidivism rates would be mediated by greater adherence to the need principle of the Risk Need Responsivity model (RNR; Bonta & Andrews, 2007).

2.3. Disclosure of Risky Behavior

Use of PCSOT-S post-release may impact on reoffending by leading case managers to increase supervision following disclosure of risky behavior, near misses, or minor breaches of conditions (Viglione et al., 2015; Wilcox & Donathy, 2014). Increased monitoring and/or reduced access to at-risk individuals may result in lower rates of recidivism. A relationship between polygraph use and lower recidivism rates operating through this mechanism would be mediated by level or nature of supervision.

2.4. Disclosure of Serious Breaches or Reoffending

The previous mechanisms outline ways in which PCSOT may lead to reduced recidivism. However—and somewhat obviously—PCSOT may result in higher observed recidivism due to polygraph-facilitated disclosure or discovery of reoffending or serious breaches of license conditions (e.g., McGrath et al., 2007). Evidence for this mechanism would be seen where information leading to recall or a new conviction emerges specifically from post-release polygraph testing³. While the effect of this mechanism in an individual study would be to suggest that PCSOT appears to increase reoffending, the long-term impact may be to reduce sexual abuse by identifying more quickly individuals who have reoffended, thus reducing the risk of further victimization.

2.5. Interactions and Other Mechanisms

The mechanisms above highlight some hypothetical pathways through which PCSOT may impact on reoffending. There are likely to be others. For example, an individual who ‘beats’ a polygraph test once may develop a belief that they can reoffend with impunity (Ben-Shakhar, 2008), thereby increasing reoffending. However, we propose these four mechanisms as plausible explanations for observed relationships between polygraph use and recidivism rates. It is particularly important to note that these relationships may, in fact, operate in opposite directions—at least in predicting observed recidivism rates. The effect of PCSOT on recidivism may therefore

³ Pseudo-recidivism (new convictions for old offenses) would need to be excluded from any such data.

be obscured when different pathways are aggregated. This emphasizes the importance of examining the indirect pathways between PCSOT and recidivism rates.

3. Empirical Findings on PCSOT and Recidivism

For this narrative review, we first identified relevant research using a systematic approach to literature searching, primarily using Google Scholar and databases such as PsychINFO, with varying combinations of key words such as ‘PCSOT’, ‘polygraph examinations’, ‘reoffending’, ‘recidivism’. There was no restriction on publication year. Abstracts were read and screened to establish relevance and reference lists were subsequently searched to ensure an extensive narrative review could be carried out. This process identified nine studies—outlined below and summarized within Table 1—which have explicitly explored the relationship between PCSOT and recidivism, all of which were conducted in North America. Of these studies, five examined PCSOT-S and three investigated PCSOT-T (we were unable to determine this information for one study; see note on Table 1). As legislation regarding polygraph examinations, as well as level of use, differs between the US and other jurisdictions (Wilcox & Madsen, 2009), there is a need for well-designed randomized control trials in the UK and other countries that currently administer polygraphs, to examine its impact on recidivism.

In the first examination of the relationship between polygraph use and reoffending, Abrams and Ogard (1986) compared recidivism rates between a group of 35 post-conviction participants receiving polygraph testing as part of their community supervision and 243 participants on standard probation. The polygraphed group had a two-year recidivism rate of 31% compared to 74% in the control group. Thus, polygraphs were associated with significantly lower reoffending rates, suggesting polygraph surveillance deterred recidivism. However, very few of the polygraphed group ($n = 5$) had committed sexual offenses; the majority were convicted of burglary or drug abuse (Cross & Saxe, 1992). Additionally, participants were not randomly assigned or matched; those polygraphed had agreed to probation with polygraph testing rather than custodial sentences (Grubin, 2008).

Critiquing the study by Abrams and Ogard (1986), Cook (2011) argued that a flawed definition of recidivism was used, in which only participants recalled to prison were classed as recidivists. The lack of a unified definition of recidivism is a common problem in both polygraph research and research relying on recidivism outcomes more broadly, leading to potential variation in study results (Holmes & Jacob, 2016). Furthermore, in their meta-analysis of recidivism studies, Hanson and Morton-Bourgon (2005) emphasized that a four-to-five-year follow-up period is most appropriate when studying recidivism, meaning that only using a two-year follow-up may have resulted in an inaccurate picture. In two single-group studies using PCSOT-S, Edson (1991) reported that 95% of 173 individuals with sexual offense histories receiving PCSOT-S did not reoffend within nine-years, while Abrams and Abrams (1993) reported that 90% completed probation without new convictions. However, neither used control groups, so the conclusions that can be drawn are limited (Rosky, 2012).

McGrath et al. (2007) investigated men convicted of sexual offenses; 104 received PCSOT as part of their community supervision and treatment and 104 did not. Despite not being randomly assigned, the two groups were well-matched based on risk, treatment status and release date, and no significant between-group differences were found for age, educational attainment, offense type, or risk level. At five-years, the number of polygraphed participants charged with a new non-sexual violent offense was significantly lower than those not polygraphed (3% versus 12%). However, there were no significant between-group differences for new sexual (6% versus 7%) or other (non-sexual and non-violent; 36% versus 30%) offenses, or overall recidivism (39% versus 35%). Of note, information obtained during polygraph examinations did not lead to charges for new sexual or non-sexual violent offenses for any of the recidivists.

McGrath et al. (2007) reported that breaches of license conditions (54% versus 47%) and prison recalls (48% versus 39%) were higher for polygraphed participants than controls. These differences were not significant, but the direction of the difference is noteworthy here, because it contradicts the concept of PCSOT as a deterrent. If PCSOT is being implemented with the intention

of increasing disclosures to facilitate better treatment to reduce reoffending, then logically, the control group should have displayed higher rates of breaches and recalls (Rosky, 2012). Similarly, in Grubin's (2010) two-year evaluation of 347 individuals receiving PCSOT-S compared with 108 receiving standard supervision across English probation areas, disclosures resulted in 67% more prison recalls for those polygraphed. These findings suggest polygraphs are an effective surveillance tool to detect violations, but currently fail to influence behavior (Gannon et al., 2014). Being able to detect infringements and new offenses is undoubtedly an advantage, supporting PCSOT as a monitoring tool; however, as Rosky (2012) concluded, proponents cannot simultaneously claim a surveillance and deterrent effect without evidence for the latter.

Unfortunately, it is difficult to determine the value of McGrath et al.'s (2007) findings that polygraphed participants had significantly higher rates of non-sexual violent reoffending than those not polygraphed, because participants, on average, only underwent a polygraph test once every 22-months, rather than the recommended six-months (Stalans, 2004). This may have undermined the relative effectiveness of examinations, reducing the likelihood of impacting behavior (Gannon et al., 2014), highlighting a need for future research to examine the optimal frequency of testing. Additionally, McGrath et al. (2007) indicated that polygraphed participants had typically spent less time in prison than controls; therefore, regardless of PCSOT, may have had an increased probability of re-offense detection due to greater time 'at risk' in the community. On the other hand, polygraphed participants had completed longer periods of treatment and supervision than controls, arguably reducing their risk of reoffending. Both of these factors may have influenced the results (McGrath et al., 2007). Overall, the study does not provide strong support for PCSOT reducing recidivism (Meijer & Verschuere, 2010), with researchers concluding that PCSOT's "widespread use has far outpaced empirical examination of its effectiveness" (McGrath et al., 2007, p. 391).

Drawing on the same sample of 93 men who received sexual history polygraph examinations (SHPE) as part of their supervision, and 73 men who did not, Cook (2011) and Cook et al. (2014), examined whether disclosures during PCSOT-S could improve accuracy when

predicting five-year recidivism risk. As in much of the polygraph research, examinations elicited more information, but did not significantly add to the accuracy of Static-99 recidivism predictions. Nevertheless, results indicated benefits regarding treatment engagement, suggesting polygraphs may contribute to treatment processes in ways that are not yet fully understood. Specifically, Cook et al. (2014) reported that after five-years, polygraphed participants were significantly less likely than non-polygraphed participants to have reoffended generally (12% versus 29%) or violently (4% versus 15%), but the difference in sexual recidivism rates (9% versus 14%) was non-significant. However, participants were not matched, and non-polygraphed individuals scored higher on the Static-99 (Hanson & Thornton, 1999) risk assessment, suggesting that they had a greater risk of reoffending than polygraphed participants regardless of PCSOT-S. These confounds were not accounted for in the analyses (Stuart, 2010), undermining the results.

A correlational study by Konopasek (2011) examined the relationship between timely and full sexual history disclosures during SHPE administered during community-based treatment and five-year recidivism for 192 adults (182 men, 10 women) convicted of sexual offenses. None of the variables; full disclosure of sexual history, timely disclosure, or treatment completion were significantly correlated with recidivism. However, an examination of the study results by Rosky (2015) suggested that there were issues with the manner in which some of the statistical analyses were conducted, reducing confidence in the generalizability of these findings. Konopasek and Nelson (2015) also explored SHPE as part of community-based treatment and five-year recidivism, but expanded upon Konopasek's (2011) findings by examining the extent to which non-deceptive SHPE and variables such as psychopathy and denial, were associated with treatment completion and recidivism, using 170 adult men convicted of sexual offenses. There was no relationship between disclosures and recidivism, but a moderate association between non-deceptive results and treatment completion. Reduced sexual recidivism was correlated with both receiving a non-deceptive result within six-months of treatment onset and being under 35-years-old at the time of a non-deceptive result. While this appears counterintuitive, given the ample criminological evidence

that individuals have decreased recidivism risk as they age (DeLisi, 2005), it may suggest PCSOT-T is most effective with younger individuals—a finding requiring further exploration.

In Yoder et al.'s (2018) study using the probation files of 62 adolescents with sexual behavior problems, non-deceptive polygraph results from young individuals in community-based treatment did not predict reduced reoffending risk. Like Konopasek and Nelson (2015), they reported that non-deceptive results were significantly related to treatment completion, but neither test frequency nor results were associated with recidivism outcomes. The small sample size and lack of control group limited generalizability and restricted statistical power to detect an effect (Gelman, 2013); nevertheless, this finding suggests polygraphs may influence treatment processes in ways that require further investigation.

The only UK research to reference recidivism in relation to PCSOT was Grubin et al.'s (2004) small voluntary study, in which participants disclosed engaging in fewer and less risky behaviors following their first examination, with 95% self-reporting that polygraphs helped them to avoid reoffending. However, the study was unable to examine the relationship between this and any reductions in future reconviction rates. High attrition implied that those motivated not to reoffend found PCSOT-S useful, while less motivated participants sought to avoid it.

Overall, research has established no significant impact on sexual or general recidivism, only marginal reductions in violent non-sexual recidivism, and increases in identification of technical violations and prison recalls (Elliott & Vollm, 2018). Furthermore, none of the studies outlined above have explicitly explored mechanisms or potential mediators for how PCSOT has impacted on recidivism. Of the studies which have demonstrated a significant relationship between PCSOT and recidivism (Abrams & Abrams, 1993; Abrams & Ogard, 1986; Edson, 1991; McGrath et al., 2007), findings appear to imply the most likely mechanism is deterrence. Whereas, research into the utility of PCSOT (e.g. Ahlmeyer et al., 2000; English, 2003; English et al., 2000; Gannon et al., 2014; Grubin, 2010; Heil et al., 2003; O'Connell, 1997), infers recidivism would be influenced by case managers increasing or adapting supervision to address treatment needs, through mechanisms of

increased disclosures of criminogenic need or risky behavior. There is little doubt that PCSOT provides people treating and managing individuals who have sexually offended with more risk-relevant information (for a systematic review, see Elliott & Vollm, 2018). However, this has not yet been consistently shown to translate into reductions in reoffending. The remaining sections focus on making sense of this disconnection.

Table 1

Summary of Key Recidivism Studies

Study Identification	Location	Type of PCSOT	Sample	Recidivism Measures	Follow-up Period	Outcomes
Abrams & Ogard (1986)	Oregon, US	PCSOT-S	Experimental group: 35 adult men convicted of burglary, drug, or sexual offenses ($n = 5$) who agreed to probation with polygraph testing instead of a prison sentence. Control group: 243 adult men convicted of the same crimes as the experimental group ($n = 7$ for those convicted of sex offenses).	Recall to prison	2 years (1983 – 1985)	The experimental group had a significantly lower rate of recall to prison than the control group (31% versus 74% respectively).
Edson (1991)	Jackson County, US	PCSOT-S	173 individuals with sexual offense histories received PCSOT.	Unknown	9 years	95% of those receiving PCSOT did not reoffend within 9 years.
Abrams & Abrams (1993)	Portland, US	Unknown	Unknown	Unknown	Unknown	90% completed probation without new convictions.
McGrath et al. (2007)	Vermont, US	PCSOT-S: Maintenance examination	Experimental group: 104 adult men convicted of sexual offenses who had probation or parole conditions of periodic PCSOT. Control group: 104 adult men convicted of sexual offenses who did not have PCSOT.	Criminal record checks for any new incident that could have been charged as a sexual offense, violent offense (non-sexual), or other (non-sexual and non-violent).	5 years (1995 – 2001)	At 5 years, the number of polygraphed participants charged with a new non-sexual violent offense was significantly lower than those not polygraphed (3% versus 12%). There were no significant between-group differences for new sexual (6% versus 7%) or other (non-sexual and non-violent; 36% versus 30%) offenses, or overall recidivism (39% versus 35%). Though not statistically significant, field violations (54% versus 47%) and prison recalls (48% versus 39%) were higher for polygraphed participants than controls.
Cook (2011) / Cook et al. (2014)	Oregon, US	PCSOT-S: SHPE	Experimental group: 93 adult men convicted of sexual offenses who received SHPE. Control group: 73 adult men convicted of sexual offenses who did not receive SHPE.	Any new sexual or nonsexual violent conviction.	5 years (1999 – 2005)	SHPE did not significantly add to the prediction (using Static-99) of recidivism. Polygraphed participants were significantly less likely than non-polygraphed participants to have reoffended generally (12% versus 29%), or violently (4% versus 15%). There was no significant difference in sexual recidivism rates (9% versus 14%).

Within the group that took a polygraph, recidivists went longer before taking a SHPE.

Konopasek (2011)	Oregon & Washington, US	PCSOT-T: SHPE	192 individuals convicted of sexual offenses (182 male, 10 female).	Criminal charge filed or conviction entered for any new sexual offense, of any type.	5 – 7 years, after discharge from treatment programme (1994 – 2004)	Overall, 20.8% of participants sexually reoffended within 5 years; however, when ‘failure to register’ recidivists were excluded, the sexual recidivism rate was 6.3%. The variables of ‘full disclosure of sexual history’, ‘expeditious disclosure of sexual history’ and ‘treatment completion’ were not significantly associated with sexual recidivism. Weak correlations with sexual recidivism were found for a few control variables including ‘youthful age at time of full disclosure’, ‘sexual deviance’ and Static-99R risk score.
Konopasek & Nelson (2015)	Oregon & Washington, US	PCSOT-T: SHPE	170 adult men convicted of sexual offenses, mandated by parole or probation to be evaluated and treated on treatment programmes.	Public records were searched for new criminal convictions.	5 years after discharge from treatment programme (1994 – 2004)	Overall, 22.9% reoffended, 6.5% reoffended sexually. There was a statistically significant relationship between sexual recidivism and the variable of ‘non-deceptive SHPE result’, and ‘age under 35 at time of non-deceptive result’. Denial was not significantly correlated with treatment completion or recidivism. There was no relationship between disclosures and recidivism. Reduced sexual recidivism was correlated with both ‘receiving a non-deceptive result within 6 months of treatment onset’ and ‘being under 35-years-old at the time of a non-deceptive result’. Non-deceptive SHPE result was associated with lower sexual recidivism.
Yoder et al. (2018)	Colorado, US	PCSOT-T: SHPE, Maintenance and Instant Offense tests.	Probation files of 62 youths adjudicated of a sexual crime.	Any new court filing for a sexual or non-sexual offense.	1-year, 3-year and 5-year intervals	Neither the frequency of polygraph testing nor polygraph results and disclosures were associated with treatment completion, or recidivism at any time point.

Note. At the time of writing this review, research by Edson (1991) and Abrams and Abrams (1993) were out of print and therefore unavailable. For the purpose of this table secondary sources (e.g., Cross & Saxe, 1992; Grubin, 2008; Grubin et al., 2004; Rosky, 2012) have been used to summarize these texts.

4. Limits of the Current Recidivism Literature

It is uncontroversial that recidivism figures underestimate true reoffending rates (Scurich & John, 2019), due to underreporting and undetected offenses (Meijer et al., 2008), which may be particularly pronounced for sexual offenses (Taylor & Gassner, 2010). An advantage of PCSOT is that it attempts to counter underreporting from individuals who minimize the extent of their criminality (Scurich & John, 2019). While it is vital to assess and attempt to prevent all recidivism, research suggests that those who have committed sexual offenses have low rates reoffending compared to individuals convicted of other offenses (Cunliffe & Shepherd, 2007; Wright, 2019), and typically demonstrate higher levels of non-sexual rather than sexual recidivism (Woodrow, 2011). In their meta-analysis of 82 recidivism studies encompassing 29,450 individuals convicted of sexual offenses, Hanson and Morton-Bourgon (2005) reported that the figures were 13%, 14%, and 36% for sexual, violent non-sexual and general recidivism respectively, with an average follow-up period of five-to-six-years. By comparison, in the general population of individuals with criminal convictions, approximately 45% are reconvicted within one-year post-release (McCarthy & Brunton-Smith, 2018), with rates often reaching 60% within three-years (Cochran et al., 2014).

The fact that individuals with sexual offense histories display higher rates of non-sexual rather than sexual recidivism is an important consideration, suggesting that the most prominent behavioral change following PCSOT might be detected through reductions in non-sexual reoffending (Gannon et al., 2014). Hence, McGrath et al. (2007) and Cook et al.'s (2014) findings that polygraphed participants had lower levels of violent non-sexual recidivism compared to controls, is potentially favorable evidence that PCSOT does reduce reoffending (Grubin, 2008). However, the incidence of new violent convictions in these studies was extremely low for both conditions (three versus 12 cases; McGrath et al., 2007, four versus 11; Cook et al., 2014), and though significant, reflected small differences in terms of effect sizes. Without explicitly examining mechanisms or mediators (such as those identified in our proposed model), it is difficult to determine the precise relationship between PCSOT and recidivism. Furthermore, the low base rate

of reoffending among individuals convicted of a sexual offense necessitates larger samples and longer follow-ups in order to reach sufficient statistical power in future research (Mews et al., 2017).

According to the risk principle of the RNR model (Andrews & Bonta, 1994, 2010), individuals regarded as highest risk of reoffending require higher intensity programs. Based on UK research (Gannon et al., 2012) findings, UK legislation mandates PCSOT-S only for those assessed as highest risk. However, the prevalence of PCSOT in the US (80% of adult community programs; McGrath et al., 2010) suggests a lower threshold in terms of assessed risk and use of polygraphs. Understandably, the devastating consequences of sexual offenses could be argued to demand harsher standards of community monitoring processes (Kim et al., 2016), but equally, the impact of other offenses can be damaging to the victims and wider society (Spalek, 2016). As a time-consuming and costly process (Grubin, 2010), which so far has minimal evidence of long-term impact with those convicted for sexual offenses (McGrath et al., 2007), it may be more effective to focus polygraph use, as a supplementary resource, on the management of individuals convicted for non-sexual offenses, since this population has a higher risk of reoffending. This idea has been supported by qualitative accounts from both Spruin et al. (2018) and Wood et al.'s (2020) evaluations, in which case managers believed polygraph testing should be used with other types of offenses. This is an area that warrants further research, to uncover the extent to which polygraph examinations can influence reoffending based on offense type.

5. Potential Explanations of Mixed Findings

Our arguments above suggest that it may not be possible to draw firm conclusions from the empirical evidence on whether PCSOT impacts reoffending. However, Gannon et al.'s (2019) meta-analysis demonstrated that polygraph use in treatment was associated with weaker treatment effects than treatment approaches that did not include polygraphs. While this conclusion may be confounded by a number of factors, we examine possible explanations for this finding.

5.1. Addressing Denial or Identifying Treatment Needs

Sexual offending is associated with a great degree of secrecy, cognitive distortions and blame-shifting from people identified as having committed sexual offenses (Ware & Mann, 2012; Westwood et al., 2011). Research suggests that those with sexual offense histories characteristically deny or minimize their responsibility (Ware et al., 2015), which in turn has been found by some researchers to hinder treatment engagement (e.g., Levenson & Macgowan, 2004; Ware & Mann, 2012). As a result, a number of clinicians have previously emphasized the importance of full disclosure (Farber, 2003; Farber & Hall, 2003; Frost et al., 2009), which has become an inclusion criterion and/or principal goal to be achieved within treatment programs (McGrath et al., 2010; Meijer et al., 2008). The view that denial is an obstacle to treatment has persisted into modern interventions for individuals convicted of sexual offending (for examples see Fourie, 2017; HMIP, 2010; McGrath et al., 2010; Ministry of Justice, 2010).

PCSOT can be beneficial in helping individuals overcome barriers to honesty and has been credited for success in breaking through denial (Edson et al., 2007). However, in Hanson and Morton-Bourgon's (2005) meta-analysis, problematic sexual preferences and antisocial orientation were identified as major predictors of sexual recidivism; whereas, several variables commonly addressed in treatment programs, including denial, had little to no relationship with sexual or violent recidivism. A number of researchers have sought to clarify the relationship between denial and reoffending but have consistently found no overall effect of denial on recidivism (e.g., Harkins et al., 2010; Langton et al., 2008; Thornton & Knight, 2007). Indeed, in Konopasek and Nelson's (2015) investigation into the relationship between SHPE and recidivism, denial was not significantly correlated with treatment completion or recidivism. Moreover, researchers such as Collins (2019), have expressed concern that those managing individuals convicted of sexual offending, may come to depend upon polygraph examinations as a tool to tackle denial, at the expense of clinical judgement and experience, ultimately resulting in professionals who are de-skilled in assessing risk.

A prominent finding in PCSOT research is an increase in disclosures concerning numbers of unknown victims (e.g., Ahlmeyer et al., 2000; Bourke et al., 2015; Heil et al., 2003; Van Arsdale et al., 2012). However, some research suggests that full disclosure of negative personal characteristics is associated with adverse social outcomes, including poor treatment progress (Kelly, 2000). Specifically, research has demonstrated that denial regarding the number of victims, is not significantly related to recidivism (Harkins et al., 2015), potentially explaining why PCSOT has not been shown to strongly influence reoffending in research to date. It appears that rather than focusing on identification of criminogenic treatment needs or risky behavior, the emphasis of PCSOT may have focused unnecessarily on addressing denial and minimizations; for example, trying to ascertain a complete sexual history and obtain a more thorough account of previously undisclosed sexual activities.

It should be acknowledged that those who minimize their sexual crimes are at least indicating an awareness that sexual offending is wrong (Hanson & Morton-Bourgon, 2005). This is supported by crime desistance literature from Maruna (2001, 2004) involving individuals with all types of offending histories, demonstrating that those who cease criminal activity are more likely to have made excuses for, or denied their offenses, than those who continue a criminal lifestyle. Likewise, two compelling studies by Nunes et al. (2007) found that categorical denial among actuarially determined high-risk individuals with sexual offense convictions was associated with a decrease in reoffending. This is important to consider because in the UK, polygraphs are primarily used for those classified as high-risk, and this evidence suggests that overcoming denial should not be a priority with this group as it may, in fact, have unfavorable consequences. Furthermore, in an assessment by Marshall (2014), only 3% of 82 categorical deniers with sexual offending histories were found to have committed a further sexual offense three-years post-release, having been treated in a program setting aside concerns about denial. Unfortunately, no comparison could be made to a control group. Nevertheless, collectively this research implies that the focus on overcoming denial

during polygraph examinations may be unnecessary or even counterproductive and potentially explains why PCSOT has not been shown to impact reoffending.

5.2. Impact of Polygraph Use on Case Manager Relationship

Regardless of client characteristics, virtually all research supports that prosocial change is most likely to occur within the context of a trusting relationship (Constantino et al., 2017). The ‘therapeutic alliance’, described as an emotional and collaborative bond between the professional and client, can explain over 30% of the client’s outcome variance (Lambert, 2013), exhibiting a substantial negative relationship with recidivism risk (Blasko & Jeglic, 2016). While few researchers have studied the therapeutic alliance between those convicted of sexual offenses and their case managers (Bailey & Sample, 2017), the nature and stigma of sexual offending may present unique challenges when attempting to build a positive, trusting relationship (Youssef, 2017). Nevertheless, a strong relationship is recognized as imperative for the identification of needs, ongoing engagement, and ultimately for rehabilitation (Elvins & Green, 2008).

Unfortunately, within correctional settings, the importance of developing a trusting relationship appears to have become disregarded (Gannon & Ward, 2014) through a shift from a supportive to a surveillance approach (Burnett & McNeil, 2005). In the context of compulsory supervision, this has introduced a ‘dual relationship’ problem, whereby case managers are expected to care for their clients but are forced to prioritize community protection (Birgden & Ward, 2016). This is in opposition to the established finding that a trusting relationship is more effective at reducing recidivism than a surveillance approach to risk management (Kozar & Day, 2012).

The key characteristics identified as crucial for building a positive relationship include: non-confrontational approach (Watson et al., 2017), trust (Marshall & Serran, 2004), and providing hope (Lewis, 2014). Arguably, PCSOT undermines all of these and exaggerates the already apparent power imbalance between case managers and their clients (Skeem et al., 2007). Individuals may find it especially difficult to trust their case manager, as imposing mandatory polygraphs emphasizes that their primary role is security management (Gannon & Ward, 2014).

Simultaneously, PCSOT may impair the case manager's trust if the individuals they manage produce deception-indicated results (Dealey, 2018). Furthermore, PCSOT is a confrontational approach (Marshall et al., 2003), which has been described as an overly coercive (Chaffin, 2011), punitive tool (Ross, 2008). Confrontation is associated with withdrawal and resistance (Serran et al., 2013); for example, Hudson (2005) found that men convicted of sexual offenses reported that when their supervisor was confrontational, they simply learned what to say rather than engaging in a meaningful manner. This hinders a case manager's ability to adhere to the responsivity principle of RNR, which may moderate the relationship between disclosures of criminogenic need during PCSOT and reduced reoffending.

A few case managers have indicated that PCSOT was not helpful or had detrimental effects on their relationship with supervisees (Grubin et al., 2019). Additionally, Spruin et al. (2018) reported that non-polygraphed participants believed PCSOT would negatively impact trust. However, there is currently no direct evidence to demonstrate that PCSOT undermines a trusting relationship, and some proponents argue that relationships are in fact strengthened by bringing problematic behavior to light or enabling an individual to demonstrate that they are not engaging in risk-related behaviors (Grubin, 2010). In Wood et al.'s (2020) evaluation, case managers often reported that a successful test led to a better working relationship, and supervisees felt this could increase trust as their case manager was more likely to believe them. Though, it is possible that because case managers are typically aware of the research aims during PCSOT evaluations, they may have reported biased responses in favor of the polygraph condition (Gannon et al., 2014). It is important that more longitudinal research evaluates the benefits and risks of the polygraph in greater depth, as clearly little is known about the precise effect PCSOT has on trusting relationships (Gannon et al., 2014).

5.3. Translating Polygraph Findings into Effective Practice

Case managers usually operate under a risk management model, with risk guiding decision-making (Viglione & Taxman, 2018), and resource allocation (Tully et al., 2013). In Grubin's (2010)

voluntary PCSOT-S pilot study across UK probation areas, risk levels were more likely to be increased for polygraphed participants, whereas risk levels for non-polygraphed participants were typically lowered (see also Buschman et al., 2010; Emerick & Dutton, 1993; Grubin et al., 2004; Grubin et al., 2014; Van Arsdale et al., 2012). Grubin (2006, 2010) described disclosures, alongside test outcome, as directly influencing supervision changes three-times more often for polygraphed rather than non-polygraphed participants, indicative of meaningful clinical impact. Likewise, both Gannon and colleagues' (2012, 2014) mandatory PCSOT-S pilot study and Wood et al.'s (2020) evaluation concluded that case managers undertaking PCSOT-S, were more likely to take preventative action rather than maintaining the same supervision following disclosures, and on average, reported the polygraph was helpful in management decisions. Undoubtedly, consideration of risk and security is important within community supervision; however, an overreliance on surveillance and too much focus on risk (Bourgon & Gutierrez, 2012), accompanied by threats of punishment, cannot, on their own, be expected to change an individual's risk-relevant factors responsible for persistent offending (Newstrom et al., 2019).

Research consistently demonstrates the importance of individualized focus when assessing risk or treating those convicted of sexual offenses (Mann et al., 2010). Flexibility to effectively adapt provision in response to new insight or changing situational demands is crucial for maximizing long-term outcomes (Johansson et al., 2012). PCSOT should, in theory, facilitate more flexible and individualized management, through increased knowledge provided by individuals' disclosures. However, PCSOT may instead be leading to over-prediction of risk (de Vries Robbé et al., 2015) and unnecessary increases in supervision, which is not cost-effective (Miller, 2006) if it has no influence on reoffending rates (Hyatt & Barnes, 2007). Interestingly, most supervisees in Wood et al.'s (2020) evaluation reported that the polygraph had not impacted their supervision in any notable way, even if they had made risk-relevant disclosures. It is possible that PCSOT is being over-relied upon as a tool to determine risk categorization, rather than the information gained being used to inform appropriate alterations to supervision that promote behavioral changes. If

information acquired through polygraph disclosures is not being effectively acted upon (Grubin, 2015), this may explain why disclosures of criminogenic need and/or risky behaviors have not influenced recidivism in the research thus far.

Experience from the UK evaluation studies (e.g., Gannon et al., 2012) suggested that case managers sometimes struggled to decide what action to take following polygraphs, particularly when the test result was ‘deception-indicated’ (NOMS, 2014). Despite supervising some of the most challenging individuals, many case managers receive no formal training to facilitate behavioral changes (Gannon & Ward, 2014). Therefore, it is not surprising that they may struggle to effectively tailor provision based on polygraph disclosures. In addition, case managers are further hindered by limited time, financial strain and low staffing levels (McCartan et al., 2018), placing them under excessive pressure (DeMichele & Payne, 2017). Case managers in Wood et al.’s (2020) evaluation, highlighted the increase in their workload introduced by PCSOT as a key challenge. In research by Hoggett et al. (2019), qualitative analysis identified that the high caseloads being managed by supervisors caused concern about their ability to fully monitor each individual. Moreover, high caseloads (Gregory, 2010) may result in a detached case manager, or even one who is just perceived as such, which is a further barrier to a trusting relationship (Burnett & McNeil, 2005). While there is evidence that non-psychologists have facilitated programs resulting in reductions in antisocial behavior, negative thinking styles and reconviction (e.g., Friendship et al., 2003; Tapp et al., 2009), providing case managers with psychologically-informed, specialist training, may prove beneficial. This would increase their confidence and help to teach the technical and interpersonal skills required to take risk-relevant disclosures made during PCSOT, and implement effective changes through flexible, individualized, evidence-based practice.

6. Conclusion

This review began by proposing mechanisms through which polygraph testing could be expected to influence offending behavior. However, evaluating the existing studies that have examined the influence of PCSOT on recidivism, revealed that research thus far, has not

demonstrated an impact of PCSOT on sexual or general recidivism, only marginal reductions in violent non-sexual recidivism, but has shown increases in identification of technical violations and prison recalls (Elliott & Vollm, 2018). Due to methodological limitations (e.g., small sample sizes, inadequate comparisons, inconsistent definitions and follow-up periods), and no explicit consideration of potential mechanisms and mediators (such as those identified in our proposed model), it remains unclear whether relationships between polygraph examinations and recidivism have been obscured by factors which have been unaccounted for.

While it must be acknowledged that alternative accounts may exist, this review considered potential explanations for why PCSOT has failed to demonstrate an influence on recidivism. Firstly, it was proposed that recidivism risk among those who have committed sexual offenses is so low, that research simply lacks statistical power to detect an effect. Next, the possibility that PCSOT places an inappropriate focus on overcoming denial was discussed. Research reviewed, both generally (e.g. Hanson & Morton-Bourgon, 2005) and specific to PCSOT (e.g. Konopasek & Nelson, 2015), did not demonstrate an association between denial and reduced recidivism. Accordingly, it was recommended that a greater emphasis should be placed on what information the polygraph can provide for empirically supported risk factors and treatment needs. It was then suggested that case managers, who are increasingly being relied upon despite little psychological training (Gannon & Ward, 2014) and very limited time (McCartan, et al., 2018), may be struggling to take appropriate action following disclosures. Currently, very little is known about how newly disclosed information is used (Meijer & Verschuere, 2010); therefore, providing training could be imperative (Youssef, 2017), as the success of polygraph implementation is likely attributable to the skills of supervision professionals (Gannon et al., 2014). Finally, we examined how the confrontational nature of PCSOT may come at the expense of a positive trusting relationship by undermining trust and hope (Chaffin, 2011).

The lack of research to suggest PCSOT impacts recidivism raises some important ethical and legal questions. However, as the evidence does demonstrate that PCSOT elicits an increase in

risk-relevant disclosures (Elliott & Vollm, 2018), there is a need for future research to comprehensively explore the impact of disclosures and how these disclosures can be translated into effective practice. Rather than the polygraph being an ineffective tool, it is possible that the current findings relate to a lack of understanding around evidence-based practice delivery, limiting contributions only to short-term management. As the ultimate aim of case management is to reduce reoffending (Gannon et al., 2019; Olver et al., 2011), well-designed research, conducted by impartial researchers (Collins, 2019; Rosky, 2012), who incorporate potential mediators into their research designs, to assess PCSOT in terms of treatment outcomes and recidivism, is urgently needed (Rosky, 2015). Sound evaluations are imperative to uncover whether PCSOT can have positive long-term impacts on offending behavior and to aid development of evidence-based policy and practice (Hanson et al., 2015). The focus of future research must be on ensuring that those implementing PCSOT ask the right questions, based on empirical evidence, and subsequently know how to effectively integrate disclosures into their management and supervision practices (Grubin, 2015). Specifically, research must be directed at establishing which individuals are most likely to benefit from polygraph examinations, what topics are conducive to prosocial change, and how PCSOT can be used in a manner that fosters a strong trusting relationship, to ensure everything possible is in place to prevent reoffending and future victimization.

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