Child sexual abuse material on the darknet: A script analysis of how offenders operate

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Child sexual abuse material on the darknet: A script analysis of how offenders operate

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Abstract | The development of online technologies in recent decades has facilitated the distribution and consumption of child sexual abuse material (CSAM) over the internet, which also led to the emergence of CSAM on the darknet—the segment of the internet hidden from the general public.

Using data obtained from interviews with online investigators, this study uses crime script analysis to reconstruct step-by-step how offenders operate on the darknet. The findings highlight the three phases of the script: (1) the crime set-up phase, (2) the crime completion phase, and (3) the crime continuation phase. Scripting is a practical method of developing concrete ways to address this problem. The implications of using crime scripts to fight CSAM are discussed.

Introduction

Child sexual abuse material (CSAM, also referred to as child exploitation material) is the contemporary term used to describe child pornography (Bissias et al. 2016; Krone et al. 2017). The development of online technologies in recent decades has facilitated the distribution and consumption of CSAM over the internet (Brown & Bricknell 2018; Holt et al. 2020; Westlake 2020). While it is difficult to determine the true scope of online CSAM given the challenges associated with detecting such content, research suggests that online CSAM is ever-present on all portions of the internet (Westlake 2020). For example, in Bissias et al.'s (2016) study of five peer-to-peer (P2P) networks, the authors estimated that in one month approximately three out of every 10,000 internet users around the world distributed CSAM over these networks. More recently, the Internet Watch Foundation (2018) reported that between 1996 and 2018 it had removed over 400,000 webpages depicting child sexual abuse, with 105,047 of those webpages identified in 2018 alone.

Child Sexual Abuse Material Reduction Research Program

The prevalence of online CSAM poses a threat to the health and wellbeing of both victims and broader society. The negative psychological impacts that child sexual abuse can have on victim–survivors have been documented (eg Bedi et al. 2011; Guha et al. 2019; Kendler et al. 2000; Turner et al. 2017). These include post-traumatic stress disorder (Bedi et al. 2011; Turner et al. 2017), depression (Bedi et al. 2011; Kendler et al. 2000; Turner et al. 2017), anxiety (Kendler et al. 2000; Turner et al. 2017), suicidal thoughts (Bedi et al. 2011; Turner et al. 2017) and substance use disorders (Kendler et al. 2000). In the context of online CSAM, the harms associated with the abuse can be exacerbated by the enduring nature of the material. As Gewirtz-Meydan et al.'s (2018) study of CSAM survivors found, the knowledge that images of them may still be circulating on the internet can cause adult survivors further distress as they fear that individuals will recognise them or think that they voluntarily engaged in the production of this material.

Moreover, the literature has highlighted the limitations of current techniques of disrupting online CSAM production and distribution. Not only do many law enforcement agencies lack the human capacity, resources and technologies under certain circumstances needed to keep up with online CSAM offenders (Franqueira et al. 2018; Holt et al. 2020), there is also evidence that CSAM investigators may experience adverse psychological outcomes (eg secondary traumatic stress, burnout) due to the nature of these investigations (Burruss, Holt & Wall-Parker 2018; Perez et al. 2010; Seigfried-Spellar 2018). All of this points to the need to generate knowledge that will enable the development of more efficient and effective methods of preventing and disrupting online CSAM production and distribution.

Despite the social and psychological harms associated with online CSAM, there is a dearth of literature examining specific crime commission processes that offenders undertake in creating and distributing such content (Westlake 2020). As a growing body of literature demonstrates, developing knowledge about crime commission processes can inform crime prevention initiatives, as they allow for a deeper understanding of how situational and environmental factors can influence opportunities for offending, offender decision-making and methods of offending (eg Chiu, Leclerc & Townsley 2011; Chiu & Leclerc 2016; Cornish 1994; Leclerc, Wortley & Smallbone 2011). This has the potential to enhance law enforcement techniques for investigating, detecting and preventing online CSAM production and distribution. As such, this study aims to undertake the first empirical crime script analysis to uncover the steps taken by offenders who engage in online CSAM on the darknet.

Online CSAM production and distribution

Before the advent of the internet, CSAM tended to be produced by individuals with direct physical access to victims and distributed in hardcopy formats such as magazines, physical films and photographs (Jenkins 2001; Wortley & Smallbone 2012). The rise of the internet has transformed the way in which CSAM is produced and distributed, providing a virtual platform through which offenders gain access to victims and circulate and share content anonymously and to larger audiences (Jenkins 2001).

Today, offenders have access to technologies such as digital cameras, webcams and smartphones that enable them to create CSAM and upload the material to the internet at little cost and with little effort (see Wortley & Smallbone 2012). Additionally, there is evidence that the growth of virtual spaces has facilitated new methods of CSAM production. For example, offenders may engage with minors online and ask them to supply indecent/sexual images or videos of themselves (de Santisteban & Gámez-Guadix 2018; DeHart et al. 2017; Schulz et al. 2016). Therefore, offenders no longer need to be in close physical proximity to victims in order to commit an offence, but only require online access (eg internet chat rooms, email, social networking platforms) to communicate with minors. To this extent, the internet has removed many of the barriers to accessing victims and producing CSAM that offenders traditionally faced.

Similarly, the offline distribution of CSAM has now largely been superseded by a range of online distribution methods (Jenkins 2001; Westlake 2020). A recent Internet Watch Foundation (2018) report indicated that most webpages hosting CSAM were image-hosting websites (82%), followed by cyberlockers (file-hosting sites, 5%), and banner sites (4%). Other types of webpages that were identified as hosting such material included blogs, websites, forums, search providers, image boards, video channels, and social networking sites (Internet Watch Foundation 2018). As these findings show, offenders can now exploit a variety of online platforms to distribute CSAM (Westlake 2020).

When discussing the online distribution of CSAM, it is important to distinguish between distribution that occurs via the clear web and that which takes place on the darknet. Each distribution site gives offenders different methods of evading detection and reflects varying levels of offender sophistication. The clear web refers to the portion of the internet that is indexed by search engines and easily accessible to members of the public (Martin et al. 2020; Weimann 2016). The darknet is the segment of the internet that is hidden from the general public. Individuals typically use dedicated browsers such as The Onion Router (Tor) or I2P to access it (Martin et al. 2020; Weimann 2016). These software tools operate by randomly routing users' internet protocol (IP) traffic through other users' IP addresses, effectively reducing the risk that an individual's online behaviours can be identified. Thus, offenders perceive this as an environment where the risk of detection is low and therefore operate with greater impunity (Haasz 2016; Weimann 2016; Westlake 2020).

Crime script analysis

The ways in which the darknet has changed the landscape of CSAM production and distribution warrants the development and application of a novel framework to increase the capabilities of law enforcement to investigate, detect and prevent this phenomenon (Cale et al. 2021). In this context, new knowledge about how offenders operate is critical. Crime script analysis represents one method of understanding how offenders proceed with their crime, which can generate insights into how they can be stopped (Cornish 1994). A crime script breaks down crime commission processes into a series of steps. Once a crime script has been mapped, each step of the script provides a potential intervention point to disrupt crime (Cornish 1994; Leclerc 2014). In addition, identifying more steps generates more intervention points, and therefore stopping crime is more likely.

Crime script analysis draws on the rational choice perspective, which conceptualises offending as purposive and calculated—arising in situations where offenders perceive that the benefits associated with committing a crime outweigh the potential risks and costs involved (Cornish & Clarke 1986; Leclerc & Wortley 2014). Rational choice perspectives are closely linked with situational crime prevention, which aims to reduce offending opportunities by altering the environment so that potential offenders assess the risks of offending are greater than the benefits (Cornish & Clarke 1986, 2003). Crime scripting can inform situational crime prevention—the step-by-step breakdown of a crime commission process allows for the identification of points of intervention where preventive approaches can be implemented to disrupt offending online or offline (eg Brayley, Cockbain & Laycock 2011; Chiu & Leclerc 2016; Chiu, Leclerc & Townsley 2011; Hutchings & Holt 2015; Leclerc, Wortley & Smallbone 2011).

Scripting online CSAM production and distribution

Despite the potential benefits of scripting online CSAM production and distribution processes, there has been a lack of empirical research focusing on developing such scripts. Fortin and colleagues' (2018) work on online child sexual exploitation used a script approach to examine the literature on the topic. In that study, the authors outlined how motivated CSAM offenders may start out by consuming adult pornography before transitioning to online CSAM when they learn that they can access such content over the internet. From there, offenders may escalate their involvement with online CSAM, engaging in its distribution, and may eventually produce such material and commit contact child sexual abuse offences (Fortin, Paquette & Dupont 2018).

The review by Fortin, Paquette and Dupont (2018) provides evidence on how context-specific factors can facilitate online CSAM distribution and production and the need to look at the different actions taken by offenders. However, as the study reviewed the literature rather than using empirical data collected for generating scripts, a critical need for crime script analysis of how offenders operate when distributing and producing online CSAM remains. This study sought to address this gap by conducting interviews with online investigators working in the field of CSAM.

Aim

The ultimate objective of this project is to boost the capabilities of online investigators to investigate, detect and prevent the production and distribution of CSAM in an efficient and practical way. One way to achieve this goal is to use crime scripting, which is a powerful evidence-based method to address crime problems because it offers a systematic, simple and practical template to map out solutions. Consistent with the aims of the Australian police agencies to fight CSAM, we seek to pursue the protection of children and vulnerable persons from CSAM through the novel approach of crime scripting. In this study, we present the three phases of the crime script for producing and distributing CSAM on the darknet. Finally, we highlight the benefits of this approach for investigation, detection and prevention purposes. To our knowledge, no empirical study has examined CSAM crime scripts from the perspective of online investigators operating on the darknet—arguably the most accurate and reliable data source with which to construct crime scripts in this context.

Method

Sample

Australian policing jurisdictions were invited to participate in a project funded by the Australian Institute of Criminology to examine how offenders operate to distribute and produce CSAM online. We recruited 11 online investigators from Queensland Police Service, five from South Australian Police, four from the Australian Federal Police and nine from the Western Australia Police Force (*n*=29). A total of six interviews were retained for this study as these interviews involved law enforcement officers who specifically conducted online investigations into CSAM on the darknet—the phenomenon scripted in this study. Other online investigators operated on the clear web and were thus not included in the current study.

The average length of time investigators working on the darknet had been employed by the police at the time of the study was 15.66 years. In terms of experience, these investigators had been working on CSAM for an average of 4.83 years and had previously worked in the field of sexual assault for 2.83 years on average. These investigators had worked on other types of crime online for three months on average as well. The average age of investigators was 41.66 years. Four investigators were male and two were female.

Procedure

University ethical approval and approval from each of the research committees from the relevant jurisdictions was obtained. Each police jurisdiction was first approached through a contact person (eg team leader of online operatives) who assisted with the recruitment phase of the project. Then, after approaching potential participants, the contact person provided us with a list of online investigators who agreed to participate in the project. The voluntary nature and independence of the research as well as the confidentiality of individual responses were communicated to participants and informed consent was obtained. No potential participants refused to participate in the project.

Data collection and analytical strategy

The most valuable, accurate and direct source of data to construct crime scripts of online CSAM is arguably online investigators themselves, as they can provide rich data on how offenders operate based on their experience and knowledge in this field. Before proceeding with the interviews, crime script analysis was first explained to the investigators and two examples of scripts were provided to ensure clarity of the framework.

Thereafter, each investigator was asked to describe the script adopted by offenders based on their experiences. The interviewer took detailed notes and, importantly, made a sketch of the script based on the data provided by the investigator. The interview did not progress in a linear fashion. During the interview, the interviewer guided the investigator to draw out the steps of the script from their perspective and the details of how each of those steps is executed. At multiple points during the interview, the interviewer summarised the information provided by the investigator to validate and ensure the accuracy of the script. The final product consisted of a sketch of the script involving three phases provided by the investigator and accompanying notes explaining the details of the script. These interviews were completed by the first author assisted on one occasion by a team member.

Following data collection, the scripts provided by investigators were entered into an Excel database which was used to generate the final script that best explains CSAM on the darknet. In other words, a 'mini-script' was created for each investigator as an initial guide before the final crime script was generated (see also Chiu & Leclerc 2016; Chiu, Leclerc & Townsley 2011). Using an Excel spreadsheet assisted us in organising the knowledge but also identifying offending patterns in the data, thus maximising our understanding of the script adopted by offenders.

Each interview was important as it permitted us to: (1) confirm and validate the data provided for scripting during other interviews, and (2) reconstruct the entire script by capturing each step of the script revealed during interviews. This process ensured that the final script as accurately as possible reflects how offenders operate (see also Chiu & Leclerc 2016; Chiu, Leclerc & Townsley 2011). For the purposes of this study, the script has been broken down into three phases.

Results

Crime script of CSAM offenders operating on the darknet

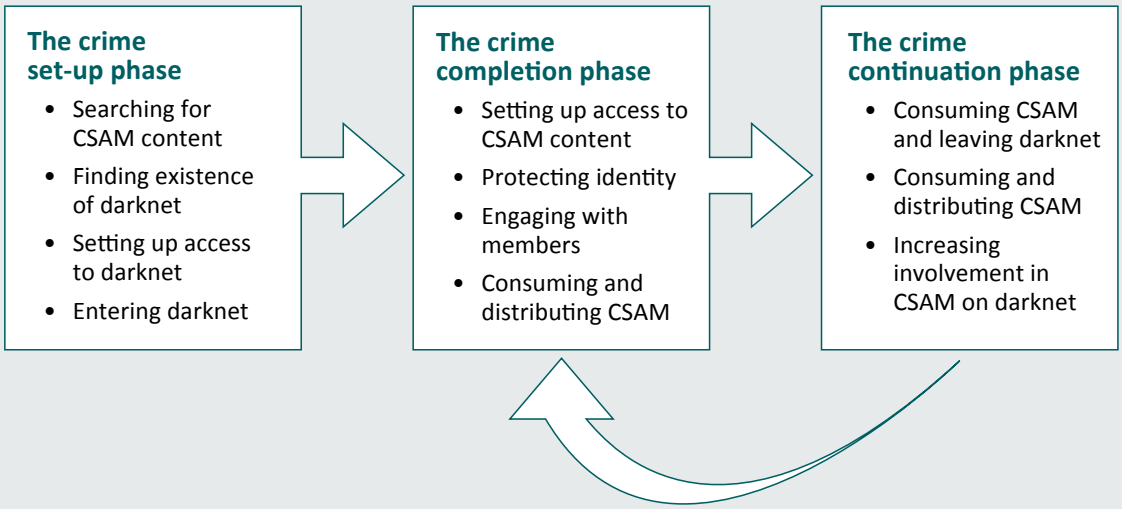
Figure 1 presents the crime script phases of how offenders operate on the darknet. The steps of the script have been grouped in three phases: (1) the crime set-up phase, (2) the crime completion phase, and (3) the crime continuation phase.

The crime set-up phase

Before accessing and operating on the darknet, CSAM offenders can have a wide range of motives for their offending behaviours including sexual gratification, the desire to explore sexuality with children, and/or validating their sexual interests. Many offenders are also seeking to interact with other individuals who share their interests, which supports their own interests in sexual activities with children (Holt, Blevins & Burkert 2010; Jenkins 2001; O'Halloran & Quayle 2010). Some offenders will also seek information on how to sexually abuse and manipulate children for this purpose (Holt, Blevins & Burkert 2010; Jenkins 2001; O'Halloran & Quayle 2010).

The crime set-up phase involves several steps. Before the first step of the crime set-up phase, there are several preconditions required for offenders to proceed. One precondition for CSAM offenders operating on the darknet is access to the internet and the ability to navigate the clear web in the first place. Rarely do offenders enter the darknet without first navigating the clear web (see Copeland, Wallin & Holt 2020; Martin et al. 2020). Once offenders with a certain propensity for CSAM are present on the clear web, they will simply search for CSAM by visiting adult pornographic websites, or searching for keywords via Google, as an example (Westlake 2020). Additionally, some learn about CSAM through discussion boards or forums on related topics (Jenkins 2001; Westlake 2020).

Figure 1: Crime script of CSAM offenders operating on the darknet



The crime set-up phase continues with offenders setting up their access to the darknet. Offenders will learn about the existence of the darknet before setting up their access. They may either stumble across information by accident or hear about it when searching for CSAM. Offenders may also learn about Tor through family, friends or websites such as Reddit and YouTube. Next, offenders will search for information about how to enter the darknet.

The crime completion phase

Once an individual has identified websites and forums that contain CSAM, they will then take the necessary steps to access these materials and set up their access to CSAM on the darknet. In some cases, individuals must create an account with a username and password to gain access to the site's protected content, as with other cybercriminal communities (eg Hutchings & Holt 2015). For many offenders, there is also a step during which they will protect their identity. Often, this will happen in response to recommendations made by other members of the community (see also Holt, Blevins & Burkert 2010). Next, offenders will engage with other members of the community, in much the same way as on regular social media platforms (eg making comments, using likes, sending private messages, posting links), which will provide a network critical for engaging in CSAM (Krone & Smith 2017), and lead them to consume and distribute CSAM based on their preferences.

The crime continuation phase

Offenders will then generally proceed in one of the following three ways: (1) consume CSAM and leave the darknet, (2) consume and distribute CSAM, or (3) increase their involvement in CSAM on the darknet. The first way simply involves offenders who will typically consume CSAM but leave the darknet for various reasons, which may include the difficulty of navigating the darknet or a lack of interest in interacting with other offenders on the darknet. The second possibility involves offenders who will repeat the above process and engage more actively in consuming and distributing CSAM on the darknet. For these offenders, the crime completion phase of the script is repeated over time as they find a platform to express themselves and engage with other offenders who have the same sexual interests. The third way involves offenders who will increase their activity on the darknet and participate in communities of certain groups of offenders and eventually gain a higher status in those communities (see also Fortin, Paquette & Dupont 2018). They will also maintain their CSAM contribution (eg by distributing) and look to join other community boards.

Discussion

Crime scripting CSAM on the darknet

This study provides, to our knowledge, the first empirical crime script of how CSAM offenders operate on the darknet. The script is characterised by three phases. Offenders have to set up their access to the darknet prior to consuming and distributing CSAM. Commonly, before offending on the darknet, CSAM offenders spend some time consuming this material on the clear web, distributing and sexually exploiting young people online, which constitutes another script. In addition, some offenders will return to the clear web after offending on the darknet. This phase is critically important as these offenders are arguably more vulnerable to detection outside the boundaries of the darknet—that is, on the clear web. This offers intervention points for detection after CSAM has been produced for distribution on the darknet (Holt, Blevins & Burkert 2010; Westlake 2020).

This script, like others, is not perfectly linear. Some offenders may not follow all the steps contained in each phase of the script in the order depicted in Figure 1. Some of the steps in phase 1, such as setting up access to CSAM and protecting identity, may overlap or occur simultaneously as offenders learn about and interact with the darknet. This is not a challenge for stopping offenders. As long as we recognise the existence of those steps, they can be used for investigation and detection purposes. Moreover, how certain steps are executed by offenders may evolve over time, especially those related to the use of data and technologies, but our knowledge of how offenders operate may also evolve. This requires organisations involved in fighting cybercrime to make their culture more receptive to data and to set up a systematic process to collect and use data efficiently (Hutchings & Holt 2015; Leclerc & Cale 2020). If we keep track of and record how offenders commit their crimes over time, we can develop additional crime script steps to create new intervention points, which will reveal other ways to disrupt crime. The script can be adapted according to how offenders' methods evolve over time (Leclerc 2014).

Boosting law enforcement capacity to detect, investigate and prevent CSAM on the darknet

A logical step for future research is to examine the process step-by-step rather than each phase of the crime script, which would uncover all the actions undertaken by offenders and thereby boost the capacity of online investigators, or any individuals or institutions working to prevent this crime. The steps offenders take to set up their access to the darknet and CSAM give us critical information on how offenders are using information technology skills for their crimes. It is imperative that police organisations keep investigators up to date with evolving technologies through training to facilitate their work online. Once the steps in each phase of the script have been examined, it will be possible to think of and use those steps as potential intervention points. Similarly, the data circulated and shared on the darknet between offenders on how they produce CSAM could be collected in a systematic fashion to enhance the current script and then re-used for training purposes. In fact, many of the script steps represent promising data points that can be leveraged by the police (see also Lee & Holt 2020).

The crime script outlined here can serve educational functions and be used as part of a development program to rapidly upskill new and upcoming online investigators on how CSAM offenders operate specifically. As indicated by Marcum and her colleagues (2011, 2010), specialised training on CSAM is critical to combat this phenomenon, especially in a context where human and financial resources are limited. These studies suggested that specialised training in cybercrime significantly increased CSAM arrests in 2007 but not in 2008. It is critical to note that the cybercrime training evaluated in these studies did not focus on CSAM activities or processes specifically. In fact, no information was available as to the training content (whether and how CSAM was covered), training length or the qualifications of the individuals administering the training, which only reinforces the need to design targeted training programs on CSAM processes to enhance investigators' capacity to address this phenomenon. Knowledge of CSAM processes could also be disseminated among online investigators operating in different jurisdictions nationally and internationally, regardless of their experience. Moreover, scripting can be used to identify historic failure points of investigations, allowing police to improve their online operations and/or make a stronger case to higher management about the complexity and priority of CSAM investigations and the need to increase the resources deployed to address this crime. Finally, crime scripting can set an international benchmark on how to understand and approach the CSAM problem.

Conclusion

The challenge we are facing as a society is that CSAM will not dissipate regardless of the tools employed by the public and private entities who police the internet (Lee & Holt 2020; Westlake 2020). The statistics on the prevalence of CSAM are alarming and are likely to increase as the internet becomes accessible to more and more people. In addition, CSAM arguably generates more child sexual abuse than ever before as many offenders are finding a relatively safe space to express their interests. Moreover, without diminishing the negative psychological impacts that CSAM has on victims (eg Bedi et al. 2011), online investigators working in the CSAM field may also experience negative consequences somewhat similar to those observed among victims (Burruss, Holt & Wall-Parker 2018; Perez et al. 2010). In other words, CSAM leads to negative consequences for societal wellbeing globally.

Crime script analysis assists in better understanding, investigating, detecting and preventing crimes. Scripting is a practical method to develop concrete ways of addressing this problem—and is easy to apply to real cases. It fits well with the work led by the Australian Federal Police, who recently established the Australian Centre to Counter Child Exploitation.

There are several steps that can be taken from here. First, in addition to the points above, the ways CSAM offenders operate on the clear web can also be mapped using crime scripts. This would not only provide a framework to address CSAM on the clear web but also make better sense of the whole CSAM process, which often involves both the clear web and the darknet. Second, there is a need for crime scripts to be used by police agencies in collaboration with others involved in cybercrime investigations who may come across evidence of CSAM (eg those in the banking industry). Third, and related to the previous point, online investigators are dedicated to combatting CSAM despite the many challenges they face during their work, such as lack of time and insufficient staff. There is a need to be more responsible as a society and to facilitate their work by ensuring and protecting their wellbeing, providing them with more resources (human, financial, technological) and creating channels for the transfer of knowledge and expertise among them.

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