

Lawless space theory for online child sexual exploitation material offending

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ABSTRACT

Deterrence, treatment and legal response to online child sexual exploitation material (CSEM) offenders is enhanced by the joint consideration of technological behaviours and cognitions. CSEM offenders choose an environment based on both psychosexual needs and utility, and in turn that environment shapes future behaviour and reinforces cognitive distortions. This paper introduces lawless space theory, a theory of cyber criminality which posits that offenders will primarily choose and utilize a perceived lawless space that best meets their psychosocial and criminogenic needs in the most frictionless way; habituation and differential association in the lawless space will reduce the perceived risk; normalization will increase comfort in a particular lawless space, increasing friction costs that must be overcome to switch technologies; and additional countermeasures will only be implemented by offenders to reduce perceived risk and lower cognitive dissonance, but not at the expense of utility. The theory is explored through the exemplar of CSEM offences and offers explanatory power for the lifecycle of a lawless space, the use of legacy spaces in the presence of objectively more capable options, the simultaneous use of multiple spaces to meet different psychosexual needs, and the adoption of new technologies by offenders. Additionally, the gateway choice and progression of lawless space usage informs investigations, risk assessments, and deterrence efforts and provides behavioural treatment targets.

1. Introduction

There are well established, comprehensive theories of sexual offending (Finkelhor, 1984; Hall & Hirschman, 1992; Marshall & Barbaree, 1990; Ward & Beech, 2006; Ward & Siegert, 2002) and general criminological theories that have been applied to Internet and child sexual offences (Jaishankar, 2011; Jewkes & Yar, 2013; Leukfeldt & Yar, 2016; Wortley & Smallbone, 2006) but research has identified differences between traditional contact sex offenders and Internet-only Child Sexual Exploitation Material (CSEM) offenders, who tend to be less antisocial and to have greater technology access to facilitate offending (Babchishin et al., 2015; Elliott et al., 2013; McCarthy, 2010). In an effort to reconcile these, problematic Internet use and cyber criminology have been incorporated into prior work (Beech et al., 2008; Elliott & Beech, 2009) and resulted in new theories dealing primarily with online CSEM offenders (Beech et al., 2008; Quayle & Taylor, 2003; Seto, 2019). The current theories generally address motivation, however they do not provide explanations with adequate face validity for all of the technological behaviours seen in CSEM offenders. These include offenders continuing to use outdated technologies when objectively better

technologies are available (Steel et al., 2020a), their limited use of encryption and other countermeasures (Eneman, 2009), their usage of platforms that are regularly monitored by law enforcement (Liberatore et al., 2010; Wolak et al., 2014), and their utilization of high risk ecosystems. The lack of explanatory power within existing frameworks for these observed behaviours by CSEM offenders provides an opening for a new theoretical approach.

This paper introduces Lawless Space Theory (LST), a new model for understanding the technological behaviours of cyber offenders, which is presented through the lens of online CSEM offending. Understanding CSEM offenders' technological behaviours is important for deterrence efforts (Quayle & Koukopoulos, 2019; Steel, 2015), for treatment planning and implementation (Quayle & Taylor, 2002b), and to better inform the legal response (Hamilton, 2011; Jewkes & Andrews, 2005; Steel, 2014; Ward, 2019; Wells et al., 2007). A lawless space, in this context, is a technology ecosystem where there is a perceived lack of capable guardianship that facilitates Internet-based criminal activity. LST looks specifically at the intersection between the virtual environment created by the use of technologies (and the physical spaces where they occur) and the motivated cognitions that reflexively interact over

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time to facilitate online CSEM offending. Offenders affect their environment, but are also affected by it through mechanisms such as habituation (a decreased response to a stimulus through repeated exposure) and differential association (the vicarious learning of criminal behaviour through interaction with others) (Jeffery, 1995). The choice of and interactions with a lawless space are summarized in Fig. 1 below.

This work presents LST in detail, identifying how combining the cognitions and technology choices of CSEM offenders can better explain their observed behaviours. The theoretical basis for LST and its applicability to CSEM offending based on relevant, existing sex offender and criminological theories, along with behavioural neuroscience and economic theories is then presented. The specific areas of these theories applicable to LST are highlighted, as are the gaps in current theoretical approaches. Finally, practice implications for operationalizing the theory as well as a methodology for testing LST are proposed.

2. Lawless space theory

The American Wild West is often held up as the canonical example of a lawless space (O’Roardon, 2004), presented through movies and literature as being rife with criminality, with limited oversight by law enforcement. Though there were specific areas with high crime, the American Wild West is more accurately a representation of a *perceived* lawless space (Agnew, 2017). Similar to the American Wild West, the Internet has also been labelled a lawless space, and parts of it may be so in both perception and reality.¹

While the Internet as a whole is not a lawless space, there are virtual subsets of the Internet that are *in effect* lawless. On the dark net, for example, most criminality goes unreported and unpunished. In 2017, only 1 out of every 300 Internet crimes was estimated as having been reported to law enforcement (Bayerl and Rüdiger, 2018), whereas sexual assaults, which have historical low rates of reporting, are estimated as having a reporting rate of 35 % (105 out of every 300) (Langton et al., 2012). The impact of this situation and the perceptions of it can be seen in a corollary illegal content issue - music piracy. Looking at music piracy on the Internet, Chiang and Assane found that “piracy occurs when an individual is unwilling to pay for a good but is willing to acquire a pirated version of it” (Chiang & Assane, 2009, p. 514), noting that increasing the perceived risk of piracy can reduce demand. Similarly, the perceived lawless spaces facilitated differential association, and normalized the piracy (Cheung, 2013). Differential association includes learning motives, drives, rationalizations, and attitudes (Sutherland et al., 1992), but also techniques and countermeasures. For LST, both traditional differential association as well as an amplification effect from social learning through indirect social and non-social interaction are posited (Matsueda & Akers, 1999). Similar effects would apply equally to online CSEM consumers in virtual environments, and there is significant overlap between the piracy community and the CSEM offender community, with pirate sites providing another mechanism for CSEM acquisition (Watters, 2018).

Increased lawlessness can change perceptions as well, particularly with regard to capable guardianship. Hollis et al. provide an operational definition of guardianship as “the presence of a human element which acts – whether intentionally or not – to deter the would-be offender from committing a crime against an available target” (Hollis et al., 2013) While there are no physical agents present in cyberspace, there are visible deterrents which indicate human agents behind-the-scenes, ranging from warnings on search engines (Steel, 2015) to discussions of arrests on message boards (Jenkins, 2001), whose presence qualifies as what Felson notes as informal guardianship “whose mere presence serves as a gentle reminder that someone is looking” (Felson, 1998, p.

28). As an example of the cyber effects of informal capable guardianship, a warning banner (Maimon et al., 2014) was found to reduce the duration of malicious behaviour (hacking) when displayed on compromised systems. LST uses Felson’s informal guardianship definition, enacted through cyber warnings and indicators as well as discussions of arrests and other negative consequences as indicators of a law enforcement presence, as an operational definition of capable guardianship in the virtual realm.

Different lawless spaces have different barriers to entry, both technological and social. At one end of the spectrum, an individual using a peer-to-peer application for other purposes (e.g., downloading music) can easily search for CSEM using lay terms (e.g., “young boy sex”) without needing any specific skills or prior associations. At the other extreme, closed dark net forums may require the installation and use of more complex technologies (e.g., Tor and Bitcoin), and may require the submission of illegal content obtained a priori (Jenkins, 2001), requiring prior sophistication. As such, certain spaces may be considered likely “gateways” to other spaces. Each space may have a different lingua franca, and create a subculture adapted to meet the needs of its members (Jenkins, 2001; Steel, 2009b).

LST provides explanatory power for the initial choice of and continued usage of a particular lawless space. Specifically, LST posits that:

1. Offenders will primarily choose and utilize a perceived lawless space that best meets their psychosocial and criminogenic needs in the most frictionless way.
2. Habituation and differential association in the lawless space will reduce the perceived risk.
3. Normalization will increase comfort in a particular lawless space, increasing friction costs that must be overcome to switch technologies.
4. Additional countermeasures will only be implemented by offenders to reduce perceived risk and lower cognitive dissonance, but not at the expense of utility.

The factors that are involved in the choice of and usage of lawless spaces are detailed below.

2.1. Technology choice and psychosocial needs

The needs of CSEM offenders, in particular the desire to engage with pornographic material that is consistent their sexual preferences (Seto, 2010) and while reducing their cognitive dissonance related to their actions (Bartels et al., 2016), will drive their interactions as they seek to fulfil these needs (Houtepen et al., 2014), which are primarily psychosexual in nature. These needs can be fulfilled in multiple ways, and with the Internet offenders have numerous technological options for meeting those needs. Evaluating the psychosocial and criminogenic needs of offenders in the context of a lawless space is as critical as viewing other criminological activity within a physical environment. The needs that drive offenders to a particular lawless space need to be understood to focus deterrence efforts on both gateway activities and on controls that actually mitigate risk and do not simply facilitate risk transfer. Investigatively, the choice of a lawless space may provide profiling information on a particular offender and their likelihood of using other, complementary lawless spaces and ultimately enhance an understanding-based approach to CSEM casework. The application of traditional profiling to CSEM offending is in its infancy, but shows promise for investigative prioritization (Brown and Bricknell, 2018; McManus et al., 2011) and in understanding the move from Internet to contact offending (Elliott et al., 2013). Finally, the cognitive distortions present in a particular individual may drive their selection of a specific lawless space (e.g., an individual may avoid live streaming to facilitate a Virtual is Not Real distortion) and interacting in that space may enhance future offence supportive cognitions (e.g., supporting minimization

¹ The National Society for the Prevention of Cruelty to Children even named its 2019 campaign against Facebook implementing encryption the “Wild West Web”.

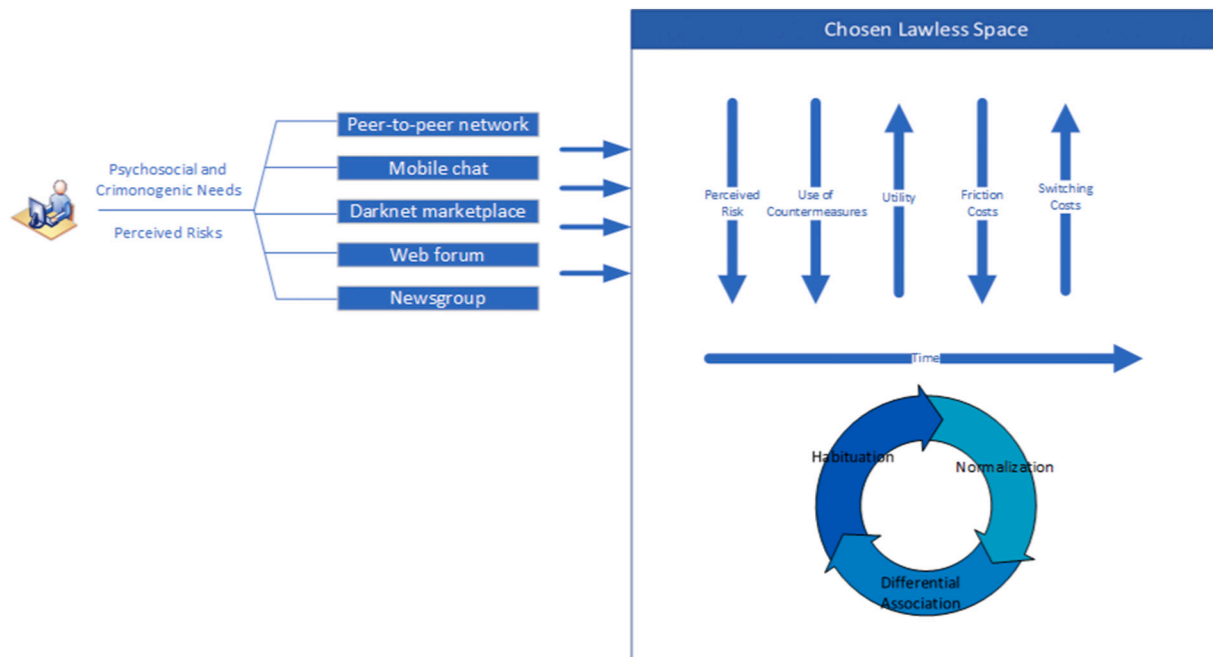


Fig. 1. Lawless space interactions.

beliefs by comparing their behaviour to that of others) (Paquette et al., 2019). Disrupting that cycle can be used to enhance behaviourally-based treatment interventions.

There are multiple virtual ecosystems that comprise the lawless spaces on the Internet relevant to CSEM offenders. For example, peer-to-peer networks provide rapid, large scale content acquisition, but content persistence is highly variable (Bissias et al., 2016) and there is generally no direct interaction between offenders. The dark web, in contrast, has highly targeted content available freely and for purchase, and includes forums for interaction (Guitton, 2013), but has sites that are highly variable in availability despite having a large presence on the dark web overall (Dalins et al., 2018; Owen & Savage, 2015) and has historically had slow access to content (Dingledine & Murdoch, 2009). This requires an offender to make trade-offs when determining which technology to use based on the options that they have knowledge of (which may evolve over time, both through learning about existing options and through the advancement of new technologies). Based on prior work and preliminary investigations into the needs of offenders (Steel et al., 2021, 2022), proposed factors taken into account when offenders choose an ecosystem may include:

1. Diversity and quantity of content available.
2. Persistence of content availability.
3. Perceived lack of law enforcement presence.
4. Ease of use.
5. Speed of content acquisition.
6. Socialization features.
7. Comfort level with technology.

The availability and ease of acquisition of content relevant to a particular offender is hypothesized to be of prime importance. Content availability varies greatly between platforms, both as an absolute and as a percentage of the available material (Bissias et al., 2016; Steel, 2009a, 2009b; Wolak et al., 2014). The amount and severity of offending CSEM content present may contribute to the view of a space as lawless. Additionally, the persistence of illegal content, both CSEM and non-CSEM (e.g., illicit drug marketplaces, pirated content, stolen identities, etc.), can serve as a signalling mechanism for a lack of capable guardianship.

In addition to content availability, social interaction is of potential importance to specific offenders. Lawless spaces have varying degrees and types of social interactions. Not all spaces require social interaction, and a lack of interaction may be a desired feature for specific offenders and may be reinforcing of their specific cognitive distortions. When present, social interactions can be passive (e.g., viewing the content on a forum) or active (e.g., posting to a forum), and can be synchronous (e.g., chat) or asynchronous (e.g., email) in nature. The use of these social interactions is detailed below.

Ultimately, the choice of ecosystem will be driven toward lowering the friction cost for the offender. The friction cost encompasses the direct transactional costs (in effort and money) as well as the indirect costs (e.g., the potential change in cognitive dissonance). Examples of direct and indirect costs are shown in Table 1 below.

When choosing an ecosystem, offenders will seek to minimize friction costs. This can be done by utilizing easier-to-use software (e.g., most peer-to-peer clients), by reducing cognitive dissonance (e.g., joining a forum to normalize behaviour), by employing countermeasures to reduce anxiety (e.g., using Tor-based services), or by the purchase of new technologies (e.g., acquiring a faster Internet connection). The friction costs are not necessarily the same for all offenders and understanding the friction costs is important for deterrence in that they provide both a mechanism and a framework for interventions.

2.2. Habituation and differential association

Habituation, the decrease in stimulation through repeated usage, is frequently discussed in the context of CSEM as part of novelty seeking. Quayle et al. (2006) put forth arousal as the “benefit” in the cost benefit calculation, such that any reduction in arousal would reduce the value of a particular transaction, driving searches toward content that increases the arousal of the offender. Zillmann and Bryant (1986) found that users of pornography drifted toward more extreme pornography over time as arousal became more subdued with increased exposure, though habituation in general sex offenders has been questioned and conflicting research has shown a lack of change in arousal due to novel stimuli in other studies (Palk and O’Gorman, 2004). Additionally, support for the Coolidge Effect, wherein novelty in the form of a new sexual partner re-

Table 1
Example friction costs of CSEM transactions.

Financial costs	
Direct	Indirect
Cost of the content	Purchase cost of the laptop/desktop/mobile device Purchase cost of Internet service Purchase cost of countermeasure software/hardware (e.g., a second device)
Time costs	
Direct	Indirect
Proximal time to find content	Time spent to join and maintain the ecosystem (e.g., software acquisition, installation, and maintenance)
Proximal time to download and view the content	Time learning the ecosystem Delays caused by countermeasure usage Time learning the specific patois Time spent gaining access to a particular group or forum Time lost viewing or acquiring unwanted content
Psychological costs	
Direct	Indirect
Habituation to viewed content	Discrepancies between self-identity and conduct Discrepancies between societal expectations and conduct Anxiety over detection

stimulates male sexual arousal in non-human animals (Dewsbury, 1981), has been shown to be present in human men in experiments using images (Hughes et al., 2021). Habituation has also been shown to occur with men and sexually explicit material involving adults, measured through ejaculation (Joseph et al., 2015). Previous work has found that habituation to adult pornography may explain one pathway into child pornography, specifically that “some individuals habituate to pornography and that high levels of sensation seeking and extensive online pornography use may be important risk factors for CP consumption” (Ray et al., 2014, p. 537). Additionally, CSEM offenders with longer periods of activity have been found to possess higher amounts of more severe content (Quayle & Taylor, 2002a), and view more deviant content such as bestiality material (Seigfried-Spellar & Rogers, 2013). One reason for this move toward more deviant material may be a lowering of inhibitions due to the continued presence of an aroused state within a particular lawless space, which facilitates the migration to this content. Ariely and Lowenstein (Ariely & Loewenstein, 2006) found that participants in an experiment exhibited a higher potential attraction to a twelve year old when in an aroused state; likewise, Imhoff and Schmidt (Imhoff & Schmidt, 2014) showed that male research subjects exhibited greater sexual disinhibition when in an aroused state. Babchishin et al. (2018) further postulated this as one mechanism for the transition between legal and illegal sexually explicit material, which is further facilitated when the individual performs the viewing in a lawless space where the friction costs of moving to illegal material are negligible.

What has not previously been examined is the impact of habituation on negative arousal within CSEM offenders. Negative arousal is different from extinction (which is the disappearance of a behaviour due to a lack of reinforcement) in that it is a change in emotional state and perception that occurs through fear or anxiety related to the risks associated with an activity. Specifically, the perceived risk of an action can be attenuated through habituation, reducing negative arousal, even when the actual risk remains unchanged (Slovic et al., 1986). This effect has been shown in animal studies (Nowak et al., 2014; Wheat & Wilmers, 2016), and in humans in other domains such as tobacco use (Leavens et al., 2019). This impacts the continuous risk/benefit analysis associated with offending CSEM activity in the use of a lawless space, making continued usage

more attractive, and increases the required benefit costs needed to switch lawless spaces. The longer an individual uses a particular lawless space and does not get caught or encounter any stimuli that increase the perceived risk (e.g., reading an article about law enforcement activity), the more valuable that space becomes. This also potentially influences the timing of deterrence efforts - it is easier to increase the perceived risk beyond the threshold during the first interaction than during the n-th interaction. The ambiguity around the perceived likelihood of being caught may also have an effect - Loughran et al. found that “ambiguity had an independent deterrent effect in the lower ranges of detection risk but encouraged offending for higher perceived detection probabilities” (Loughran et al., 2011, p. 1054) in non-victim contact crimes. This may have implications for specific lawless spaces and individual offenders’ perceptions of using that space related to their differing levels of perceived ambiguity of detection.

Along with habituation, differential association specific to a lawless space influences its usage. Differential association primarily normalizes behaviour through the interaction with like-minded individuals who provide CSEM offenders mutual support as opposed to social guardianship. This can occur directly through the use of forums where individuals can openly discuss their behaviours, creating a social in-group (Quayle & Taylor, 2003). On chat or message boards, offenders can trade accounts with others and post their own thoughts and actions for feedback, not realizing their choice of a forum may have created an echo chamber. Social media echo chambers lead to in-group thinking, reinforcement of pre-existing ideas, and default differential association, which impacts cognitions and emotions (Del Vicario et al., 2016).

Indirectly, everything from file names and descriptions to the amount of content available within a particular lawless space are amplifying, and open sharing of content can support motivated reasoning behind cognitive distortions. Offenders are able to observe others who are “worse” than they are, either through their comments in postings or through the types of content they make available - particularly if there is younger or more extreme content available - leading to minimization-based cognitive distortions (Abel et al., 1984; Paquette & Cortoni, 2020). Continued browsing is further reinforcing of minimization-based distortions, and each encounter with material not of interest to the offender (due to extremity of the acts depicted or victim age) potentially impacts not only proximal thoughts that allow justification immediately prior to an offence for the current browsing session but also reinforces post-hoc thoughts that justify past behaviours from prior offences (Szumski et al., 2018).

CSEM offenders may also enhance their techniques, including the use of countermeasures (Quayle & Taylor, 2003), through differential association that is both specific to a lawless space and transferrable to other lawless spaces. Through direct interaction, offenders can engage in chat and in forums where they can elicit information on how to better utilize a lawless space or learn about other lawless spaces. From a countermeasures perspective, guides on everything from the discrete use of VPNs and cryptocurrency to how-to-avoid-law-enforcement can be obtained, and Dalins et al. (2018) found that 2 % of dark net CSEM sites were education and training related, including manuals on grooming children for sexual exploitation. Outside of direct learning, vicarious social learning through observing others can occur. Learning the terminology associated with content of interest can happen through trial and error and observations of things like postings and filenames from other parties, rather than through the use of primers or similar materials. Because of this, the more time spent on-target, the more effective future time can be spent in a particular lawless space, making later transactions more frictionless and thus having a greater benefit to the offender at a lower cost.

2.3. Friction costs and switching

Individuals have been shown to choose default (status quo) options, even when presented with superior alternatives (Johnson et al., 2012;

Johnson & Goldstein, 2003; Thaler & Sunstein, 2009). In the technology realm, CSEM users are likely to stay within their chosen lawless space as long as their psychosocial needs are met, and will only switch spaces if forced to (e.g., the lawless space becomes unavailable) or if the friction costs become less than the gain in psychosocial benefit. The psychosocial benefits and costs, as driven and reinforced through the previously noted habituation, create a dynamic that changes this costs analysis. Evidence of this can be seen in the continued use of older technologies, despite objectively better alternatives being available (Steel et al., 2020a), though longitudinal studies evaluating individual offenders over time are still needed to confirm this behaviour.

The choice of constructing (e.g., installing software) and learning an ecosystem is one of involvement, however the selected ecosystem will facilitate increasingly easier event decisions (Clarke & Felson, 2017). The cost of switching ecosystems becomes another involvement decision, re-engaging the longer-term planning required to re-start the criminal behaviour. Offender technical capabilities may alter the potential costs of switching as well, with more technical users being more likely to use complex (utilizing encryption and secure browsing) spaces (Griemink, 2019). Obtaining the skills necessary to switch to a more complex (and secure) space may require technical knowledge acquisition, which requires longer-term planning unless the acquisition is incidental to the browsing of the current lawless space, such as skill learning through browsing of forums (Quayle & Taylor, 2003).

Using the Theory of Reasoned Action (Fishbein & Ajzen, 1977), user adoption of new lawless spaces can be viewed through the Technology Acceptance Model (TAM) (Davis, 1989). TAM provides a theoretical basis for users' adoption (or non-adoption) of technologies, and has been one of the most widely influential models in understanding information systems usage (Lee et al., 2003). Under TAM, users will adopt new technologies based on their perceived usefulness and the perceived ease of use, which form a behavioural intention. TAM has been shown to be robust across multiple technology domains (King & He, 2006), and drives the transition to switch to a new lawless space. The perceived usefulness of a new space is the difference between the content available combined with the lack of perceived law enforcement oversight. The friction costs to switch are the perceived ease of use. As users become more familiar with their current lawless space, the differential in perceived ease of use grows. Additionally, users will form a behavioural intention to switch only when the presence of sufficient novel content in the current space is not enough to stimulate arousal given habituation as noted above, and the perceived risk between the current space and the new space coupled with the ease of use difference is low enough (friction costs).

The friction costs of switching lawless spaces help explain the reluctance of some offenders to switch technologies, even when more viable lawless spaces exist. As an example, Usenet, a distributed set of limited functionality newsgroups based on largely obsolete technology, was the first major Internet-based CSEM lawless space (Mehta, 2001). Other technologies, such as dark net forums and message groups in encrypted mobile applications like WhatsApp provide more modern interfaces and advanced functionality, including better anonymity controls, yet Usenet persists as a CSEM distribution mechanism (A. Carr, 2004; IWF, 2018). Longitudinal studies have not been performed tracking individual CSEM offender technology usage (only aggregate usage), but LST would predict that older technologies largely represent a user base of longer-term CSEM offending, and that newer offenders would navigate toward more current technologies that they would already be familiar with through other, non-offending usage.

When switching does occur, it tends to be to lawless spaces that have similar usage paradigms (and hence a lower cost of switching) and meet similar psychosocial needs. An individual switching from web-based consumption to browser-based TOR consumption, for example, is significantly more likely to occur as switching from web-based consumption to Internet Relay Chat (IRC) or Instant-messaging based CSEM activities (Steel et al., 2022). These differential transition rates are

consistent with both the habituation and normalization as well as the impact of social learning in gateway environments.

2.4. Usage of countermeasures

Countermeasures (known as precautionary acts in behavioural analysis) are acts taken by offenders before an offence to reduce the likelihood of detection (e.g., creating a throw-away email address to register for a service), during an offence to prevent it from being detected or hide the offender's role in it (e.g., using encrypted communications on the dark web), or after an offence to frustrate attempts by law enforcement to prove the offence (e.g., using encrypted storage) (Turvey, 2014). Many countermeasures, including encryption and onion routing (a technique for anonymizing communications) can be implemented at zero financial cost. Using a traditional economic analysis where all offenders are rational actors, countermeasure usage should be ubiquitous. In practice, the use of countermeasures has been consistently low (Balfé et al., 2015). In the earliest comprehensive study (using 2001 data) that looked at countermeasures, only 20 % of offenders hid their collections using sophisticated technology (Wolak et al., 2005), and that number remained low in 2006 at 19 % (Wolak, Finkelhor, & Mitchell, 2011). Additionally, a large percentage of CSEM offenders have been found to have medium to high technology skills (Carr, 2004; Wolak et al., 2005), making the installation and usage challenges an unlikely barrier.

Since financial cost and installation/usage effort do not explain the limited usage in light of the high consequences of detection, there are other factors that must be present. In particular, the absolute risk is not the basis of evaluation but the *perceived* risk. Additionally, the value of implementing the countermeasure will be based on the reduction of perceived risk against the impact to utility (slowing down the acquisition or viewing of content), and will paradoxically decrease over time instead of increasing (as offenders become more knowledgeable). This can be explained in part through the self-management of cognitive dissonance.

Cognitive dissonance, a state of inconsistencies between thoughts and actions, causes psychological tension. According to Festinger (1962), individuals will try to reduce dissonance, and actively avoid circumstances that would increase dissonance. With online CSEM offenders, this can be achieved through cessation or de-escalation of offending. Preliminary research by Fortin and Proulx (2019) looked at four pathways of changes over time in the viewing behaviour of offenders and found de-escalation to be a viable, though infrequently taken, pathway. Alternatively, a reduction in cognitive dissonance can occur through normalization of activities (as noted above) or through the use of countermeasures. LST posits that as dissonance decreases over time, the need for (and value of) countermeasures are reduced, helping to explain why a majority of offenders do not regularly use countermeasures (Wolak et al., 2005; Wolak, Finkelhor, & Mitchell, 2011) and that usage does not increase (and may decrease, with the exception of integrated countermeasures that are present by default) over time (Lukas, 2013).

The use of countermeasures that lower the risk of getting caught potentially decreases the cognitive dissonance in offenders, which can include positive views of self that conflict with the knowledge that society views the viewing of CSEM negatively (Hoffer et al., 2010), and the ubiquity of criminal activity normalizes their deviant behaviour (Popham, 2018). Thus, individuals are likely to rationalize their safety within a lawless space rather than leaving that space to reduce dissonance, even if that space has increased risk. McMaster and Lee (1991) identified that tobacco smokers recognized the health risks of smoking, but compared to non-smokers rated their individual health risk as lower than other smokers. The knowledge of increased risk caused cognitive dissonance, but smokers reduced that not through abstention but through the application of cognitive distortions to their behaviour. Prior work has identified the use of security technologies not only to reduce the

absolute risk, but to reduce the perceived risk (reducing dissonance) by CSEM offenders (Eneman, 2009).

The Technology Acceptance Model, noted above, provides a further potential explanation for the limited usage of countermeasures (Balfe et al., 2015), as well as the low recidivism rates of CSEM offenders. Individuals in other online domains who have had negative experience with cybercrime have been shown to adopt an avoidance strategy rather than a protectionist strategy (Riek et al., 2017). By comparison, CSEM offenders who are caught may be more likely to avoid future offending than to deploy countermeasures, and current offender research looking at countermeasure usage may show a two-factor survivor bias - potential offenders who are concerned about risk may avoid offending to begin with instead of attempting to mitigate risk through technical means, and those that implement extreme countermeasures may never be caught and counted.

3. Theoretical basis for lawless space theory

Relevant, current child sex offender and criminological theories that underpin LST (or are complementary to it) and its applicability to CSEM offending are summarized below, but a more fulsome exploration of explanatory theories for CSEM offenders can be found in several other sources (Navathe et al., 2008; Seto, 2008, 2013; Stinson et al., 2008; Ward et al., 2006). In addition to the child sex offender and criminological theories, there has been recent interest in both the neuro-economic and the biological basis for CSEM offending (and general paedophilic sexual offending) (Babchishin et al., 2019). The relevant portions of these theories that support the applicability of LST are presented in brief.

3.1. Child sex offender theories

Traditional child sexual offender theory builds on general sex offender theory. Two of the most prominent current theoretical models that have been applied to child sex offending are the pathways model (Ward & Siegert, 2002) and the integrated theory of sexual offending (ITSO) (Ward & Beech, 2006).

Ward and Siegert's (2002) pathways model is a level 1 theory (a multifactor theory, as opposed to single factor or microtheories), the most comprehensive under Ward and Hudson's (1998) framework. The pathways model focuses primarily on state-based situational factors (such as proximal substance abuse) and cues or triggers, but to apply the concepts to Internet-based CSEM offending the facilitative impact of a permissive technological environment needs to be considered. This has been proposed as explanatory for other Internet-offences, for example cyberfraud by Nigerian youth (Ebenezer et al., 2016) and Sub-Saharan cyberfraud in general (Bessette et al., 2015). As the causal mechanisms from the pathways model can be incorporated into ITSO (Ward & Beech, 2006), additional areas of the model that are relevant to LST are discussed further as part of the ITSO.

The ITSO offers potentially greater explanatory power than prior theories by incorporating neurobiological factors, and has been reviewed in the context of Internet CSEM offences (Elliott & Beech, 2009). ITSO proposes that a combination of biological and social learning factors are responsible for sexual offence behaviour. Of particular interest is the concept introduced in ITSO of an ecological niche, which includes both proximal and distal (across the lifespan) environmental influences (Ward & Beech, 2006). Proximal environmental factors include physical environmental influences, and Ward and Beech (2006) argue that, if strong enough, environment can lead to offending even without the presence of other psychological factors.

Beech and Elliott (2012) present the Internet itself as the primary component of the proximal ecological niche, citing skill acquisition (Quayle & Taylor, 2003) as an integral factor in interaction in that space. Additionally, they note that acquisition of CSEM provides immediate stimulus-response based reinforcement, which is facilitated by

perceptions of anonymity and ease of content acquisition. Instead of being a static entity, an Internet-based ecological niche can also be altered or even dynamically created to meet specific criminogenic needs (Quayle et al., 2014).

As a blended theory, building on Finkelhor (1984), Seto (2019) proposed the motivation-facilitation model (MFM) of offending for general sexual misconduct but with specific applicability to CSEM offences. As part of MFM, Seto (2019) incorporates time and place as factors, as well as the lack of capable guardianship, consistent with routine activity theory. MFM does not address the method of offending specifically (e.g., choice of a technological environment) nor the trajectories of offending as LST does, but offers a strong basis for a motivation-based treatment approach.

Perception of anonymity and ease of access are noted (Elliott & Beech, 2009) as potentially causing an escalation in problematic Internet usage. The proximal ecological niche interactions also have a direct cognitive effect on offenders. Normalization occurs with routine interactions with like-minded individuals through either direct (chatting or posting on message boards) or indirect (reading content or through general content exposure) means, and can reinforce cognitive distortions and lead to new skill development, including the learning of new countermeasures and the improvement of content acquisition skills (Quayle & Taylor, 2003).

The Internet as a whole is too broad to be viewed as a monolithic niche. The overall virtual ecosystem in which a particular offender operates must be viewed contextually and may drive the types of interaction (and may be chosen to meet specific needs), as is presented in LST. Some of those virtual ecosystems can display criminogenic qualities (Taylor, 2015; Taylor & Quayle, 2008), facilitating the transacting of CSEM and making them perceived lawless spaces. These lawless spaces can differ greatly - an offender using exclusively peer-to-peer software from their desktop may have a qualitatively different interaction than an offender trading content through interactive group chat on a mobile device, meeting different social and utility-based needs and potentially forming a separate niche. To-date there has been no research looking explicitly at offender needs and their influence on technology usage and ecosystem choice within the CSEM offender population, and LST provides a basis for those interactions and a proposed method to test their validity.

3.2. Internet and general criminological theories

General criminological theories that have been applied to Internet criminality more widely (Jaishankar, 2011; Jewkes & Yar, 2013) can specifically be applied to online CSEM activity. Rational choice theory (Becker, 1968), routine activity theory (Cohen & Felson, 1979), situational crime prevention (Clarke, 1997), and social learning theory (Bandura & Walters, 1977) are all consistent with LST, and provide a contextual and motivational grounding for criminological behaviours explained by LST.

Under rational choice theory, individuals act in their own self-interests, and consider risks through an analysis of the likelihood of getting caught and the impact of their actions (against victims and against personal loss), weighed against the benefits of committing an act (Becker, 1968). Rational choice theory additionally drives the selection of *how* to commit a particular act in light of selection between multiple preferences, with criminal behaviour being consistent with rational decision making in specific contexts (Loughran et al., 2016; Taylor & Quayle, 2006). In CSEM offences, the positive value of their actions, i.e. the benefits, can be viewed as the use of pornography to activate the reward mechanisms in the brain (Hilton & Watts, 2011; Pitchers, Balfour, et al., 2010; Pitchers, Frohmader, et al., 2010). CSEM consumers therefore should "value" novel experiences, in particular viewing content that effectively stimulates the reward-reinforcement pathways; whether those pathways are reinforced by the collecting activity or the actual viewing may vary among offenders (Taylor & Quayle, 2003). The

impact of their actions is a combination of their evaluation of risks to themselves (both the likelihood of getting caught and the ramifications of getting caught) and the amount of cognitive dissonance (the strain caused by the difference between thoughts and actions) generated by their knowledge of the “wrongness” of their behaviour, which can be assessed through their endorsement of cognitive distortions.

When employing rational choice theory, both the technology usage and cognitions of offenders must be considered. Different technologies used to commit cybercrimes have different perceived values to offenders (Higgins, 2011; Kao, 2014). Under LST, this can include benefits such as the speed of content acquisition, the amount of content available, the ease of use, and familiarity, and can include perceived risks that can be generalized to the likelihood of getting caught. Similarly, the cognitions of offenders can drive their behaviours by diminishing the psychological stress related to their actions through distortions and this can have a reflexive impact (e.g., through normalization).

While individuals may not consciously weigh all of the technological factors, they cannot ignore their impact on their subjective experience when using the tools. Looking at the psychological factors, perceived anonymity is important in reducing stress (Eneman, 2009), and frequency of exposure leads to normalization (Popham, 2018) and a decrease in learned fear (Feather, 1963). There has, however, been minimal research looking at how CSEM offenders view the perceived anonymity between preference choices, and the differential impact between normalization through ready availability and quantity (the peer-to-peer model) and more in-depth interaction with like-minded individuals (the Tor forum model).

Routine activity theory builds on rational choice theory by including the concepts of time and space as well as offender and victim interaction (Cohen & Felson, 1979). Rational actors (offenders) choose to be in a particular place and time where victims are likely to be present, selecting target rich environments with a low presence of capable guardianship. In the case of CSEM consumers, the victimization is secondary and is reflected in the availability of content of interest to the offender. In the CSEM offence realm, with few exceptions, offences are rarely actively deterred at the time of the action (Steel, 2015), but the more important characteristic is the *perceived* presence of authority. With a lack of perceived authority, the Internet becomes a virtual lawless space, providing the third element necessary for criminality under routine activity theory. Research and disruption efforts have largely focused on the first element, the availability of CSEM material (e.g., (Kloess et al., 2014; Seto et al., 2015), with treatment efforts focused on the second element (the offender and their motivations). The interplay of offender motivation and their perceptions, as well as their choice of technologies, impact the third element, and provide a new area of intersectional research into the impact of virtual spaces on CSEM offending. Cohen-Almagor (2013) have convincingly applied routine activity theory to CSEM offending, highlighting the concept of virtual communities and focusing on deterrence strategies.

Online CSEM offending has also been conceptualized through general social learning theory (Bandura & Walters, 1977), particularly in relation to technological environments where communications through forums are prevalent (Jung et al., 2012), and situational crime prevention has been applied to crimes against children focusing on deterrence (R. V. G. Clarke, 1997). Wortley and Smallbone (2006) identified four environmental factors that can facilitate CSEM offending:

1. Situations can present cues that prompt an individual to perform criminal behaviour;
2. They can exert social pressure on an individual to offend;
3. They can weaken moral constraints and so permit potential offenders to commit illegal acts; and
4. They can produce emotional arousal that provokes a criminal response (Wortley & Smallbone, 2006, p. 10)

Wortley (2012) expanded on this concept, emphasizing

environmental conditions that may cause opportunistic consumption. Taylor and Quayle et al. (2006) further drew upon the applicability of situational crime theory to existing online CSEM offenders. They included risk-based decision making in that offenders evaluate the expected payoff of an action (e.g., clicking on a link) against the potential risk of adverse consequences, creating a “precriminal opportunity”. The risks are counterbalanced by the affordances offered by a particular environment that may facilitate criminality - in the case of CSEM these include persistence, replicability, scalability and searchability (Quayle, 2020). Additionally, Quayle et al. (2006) identified that the virtual environments facilitated by the Internet “constrained the behavioural repertoire”, which influenced further criminal behaviour. In particular, looking at the socialization aspects of online CSEM offending, normalization through those interactions makes future criminal behaviour more likely, but technological constraints may limit the offending.

Given the proliferation of online CSEM ecosystems, both social and non-social, the technological constraints have been largely removed and the offenders now have a choice of virtual environments in which to operate. In non-social environments, indirect normalization (acceptance of abnormal behaviour through vicarious exposure and selective environmental reinforcement) occurs, and the rate limiting factor in finding additional content becomes the expertise in navigating a particular environment. LST provides a basis for the explanation of these environment choices, consistent with the extant criminological theories noted above.

3.3. Neurological and behavioural economics theories

Neuroeconomics looks at offending from a behavioural economics viewpoint and incorporates the neuroscience of learning. The incorporation of biomarkers as a predictive or diagnostic tool are beyond the scope of this paper, but recent scholarship has noted that “currently none of these is ready yet to serve as a clinically applicable diagnostic, response, or predictive biomarker for paedophilia and child sexual offending” (Jordan et al., 2020, p. 1).

Love et al. (2015) reviewed the neuroscience of general Internet pornography usage, and found that it maps to traditional addiction models and activates the same mechanisms as substance addiction, ranging from alterations of the dopaminergic response in the reward systems to neuroanatomical changes in the prefrontal cortex. The reward system activation is relevant for searching behaviour as well as any release related to orgasm, which has been shown to activate reward seeking areas including but not limited to the amygdala, cortex, nucleus accumbens, thalamus, and ventral tegmental area (Marson, 2008). Due to the complex nature of the reward circuitry, Perry et al. (Perry et al., 2014) postulated that actions could be related to either increased reward sensitivity or to a decrease in the sensitivity to the consequences of their actions. Of particular interest to searching behaviour, the *anticipation* of a reward may activate the neural reward circuitry (Cho et al., 2013; Hommer et al., 2003; Katner et al., 1996; Knutson et al., 2001) as opposed to the receipt of the reward (such as an orgasm), with the level of activation related to the potential value placed on the reward (Kirsch et al., 2003). Additionally, according to the prediction error hypothesis, dopaminergic reinforcement only codes for the difference between the expected reward and the actual reward (Caplin & Dean, 2008), supporting greater reinforcement when novel content is acquired (Krebs et al., 2011).

The behavioural economics of choice provide a basis for CSEM technical activities as well. When provided with a default (the current ecosystem used), individuals will tend to stay with that default. Thaler et al. found that “behavioural tendencies toward doing nothing will be reinforced if the default option comes with some implicit or explicit suggestion that it represents the normal or even the recommended course of action” (Thaler et al., 2013, p. 430). CSEM offenders’ continued use of risky or outdated technologies when objectively more capable options are available is consistent with Thaler’s work.

Within the CSEM environment, finding content that drives the reward system and encourages normalization contributes further toward reinforcing the status quo. The economic concept of friction costs is applicable to CSEM offender behaviour in LST and has been applied to other domains with behavioural reinforcers. Carr and Epstein noted that if the value of two rewards is equal but one is more easily accessible, that will be the one chosen (K. A. Carr & Epstein, 2020, p. 142). Thus, the presence of similar rewards (CSEM content) on an unfamiliar ecosystem is generally less accessible, and the reinforcer needs to be substantially stronger (e.g., significantly more content or more desirable content) to overcome the friction costs of switching.

4. Discussion

The prior sections provide the basis for LST and address the foundation for its face validity, but to be of value it must have utility in practice. Additionally, the theory must be testable (and falsifiable) to be valid. The theory as applied to CSEM is able to address three areas - deterrence of future CSEM offences, targeted treatment of existing offender behaviour, and more effective legal response to offenders, including the investigation of CSEM offences and better sentencing and probation controls. Additionally, a methodology for testing LST, including the temporal nature of the habituation and normalization and the progression (and lack thereof), is presented. Finally, a brief discussion of the limitations of the theory as well as areas for further research into its generalizability are provided.

4.1. Deterrence

Targeting the supply side for CSEM makes any given lawless space less attractive by reducing the amount of content available, which lowers the psychosocial value of that space. An example effort in this space was the blocking of known-CSEM images by Google from appearing in their search results (Jutte, 2016). This reduced access to the content available, making web-based searching less valuable. Similar efforts at targeting the highest volume offenders on peer-to-peer have been partially successful in limiting the likelihood of a particular image being available at any point in time (Hurley et al., 2013), but the distributed nature of peer-to-peer networks means that the overall impact on supply has been one of rate limitation more so than one of availability.

As with drug interdictions, demand side interdictions are principally focused on arrests of offenders. By removing offenders from access the absolute number of offenders is decreased (however marginally and temporarily), but this has been criticized as a sub-optimal approach (Jutte, 2016). Under LST, the greater benefit is made through awareness of the arrests, providing a more salient reminder of capable guardianship. Hunn et al. (2020) found that a substantial minority of individuals surveyed were unaware of the illegality of viewing CSEM, showing that there is a need for additional public education surrounding CSEM offending. In particular, raising awareness at the time where an individual first searches for CSEM content through a gateway lawless space is likely to be the most effective.

Newman's defensible space theory (Newman, 1972; Reynald & Elffers, 2009), although criticized when applied to physical space design (Hillier & Shu, 2000), has applicability in the virtual realm in terms of both supply and demand. In particular, the concept of natural surveillance by both the technology itself and by participants in the lawless space are helpful. An example of technology-driven surveillance is referenced above - web search companies began visibly demonstrating capable guardianship when individuals searched for CSEM-related content by providing immediate warnings highlighting the illegality (and risk) to searchers (Ward, 2013; Watt & Garside, 2013). This was correlated with a decline in CSEM searches on those platforms implementing the warnings, but not others without warnings, though direct causation could not be shown (Steel, 2015). No similar mechanisms are

widely present on peer-to-peer systems, though Europol's Police2Peer initiative is attempting to seed warning messages posing as CSEM content (Police2Peer, 2020), and despite a large number of related arrests consumption remains high (Wolak et al., 2012). For participant-centric natural surveillance the ease, frequency, and impact of reporting of offenders in the lawless space has a potential to reduce criminal behaviour in that space. The Internet Watch Foundation (IWF) has seen an increase in individual reporting of web-based uniform resource locators (URLs) occurring (IWF, 2018) commensurate with the drop in web search activity noted above (Steel, 2015).

4.2. Treatment

With CSEM offenders, the visitation to and interaction with the technical environment, may in and of itself provide dopaminergic reward activation (and reinforce the usage of that environment). This provides two potential treatment targets - the usage of particular technologies (and engagement in the associated lawless space), as well as the cues that start the subsequent neurological reward circuitry engagement (e.g., non-offending images that cause an individual to start a session of seeking offending images). Additionally, because of the bidirectional relationship between emotion and sexual regulation, the emotions and their underlying biological regulation become targets for treatment (Quayle et al., 2006; Smid & Wever, 2019).

Treatment of CSEM offenders can be broken up into two phases - pre-arrest and post-arrest. In general, pre-arrest treatments are believed to be more effective for reasons of motivation. Individuals that self-identify are likely to both see their behaviour as problematic and to want to change that behaviour. Post-arrest (or police interaction) treatment is likely to be mandated or have other motivating factors (e.g., showing positive behaviour for sentencing purposes), and there may not be the same level of commitment present.

Post-conviction, the recidivism rates are generally low for CSEM offenders - Eke et al. (2011) found that 6 % were charged with contact offences (new and historical) and 7 % were charged with new CSEM offences. This rate includes both treated and untreated offenders, however there is limited evidence that current sex offender treatment programs reduce that rate further. Because of the low base rate for recidivism, which is predicted by LST for reasons unrelated to treatment (see Legal Response below), the number of post-conviction individuals that will benefit from treatment as a method of reducing re-offending risk is likely small to begin with. In addition to identifying individuals who have the highest risk of re-offending for a treatment intervention, the treatments themselves can be better targeted. For traditional interventions, for example using Cognitive Behavioural Therapy, there is little evidence that faulty cognitions present in traditional sex offenders are strongly endorsed by CSEM offenders (Steel et al., 2020b). In a large group of CSEM offenders treated using traditional sex offender treatment, for example, the treatment group re-offended at a higher rate than a non-treatment group (Mews et al., 2017).

In contrast to traditional treatment programs, there are targeted programs for online CSEM offenders such as the i-SOTP, which showed promising early results (Middleton et al., 2009), but was discontinued due to programme costs and the low baseline recidivism risk of participants. These focus on areas beyond just faulty cognitions, including coping skills and intimacy deficiencies, but could benefit from a greater understanding of the technological behaviours through a lawless space perspective. For example, differentiating between social and non-social lawless space users can better identify the specific psychosocial needs of an individual offender to enhance treatment. Recent initiatives, including the Coping with Child Exploitation Material Use (CEM-COPE) programme, are incorporating more applicable risk models as well as base recidivism rates into treatment planning and show promise (Henshaw et al., 2020). Additionally, putting up additional cost barriers to usage through behavioural interventions may be helpful. These can include technological barriers (removing all enabling software and

avoiding its future use) or psychological barriers (de-normalizing CSEM usage or social commitments). They can also include other initiatives that increase the awareness of capable guardianship, particularly for pre-conviction offenders, or make the risks more apparent, but this requires an understanding of what particular risks are most meaningful to an individual offender (e.g., social shaming v. prison).

4.3. Legal response

Investigations into CSEM offences are believed to have a deterrence effect as noted above, and sentencing (and subsequent probation) is intended to be both punitive and rehabilitative. For CSEM offences, sentencing generally includes having to register as a sex offender as part of a National Sex Offender Registry (NSOR), and may result in restrictions being placed on digital activities. The registration requirement is generally coupled with probation requirements banning the use of particular technologies, as well as restrictions on criminal association and even restrictions on social media usage.

CSEM offenders, as noted above, have a generally low recidivism rate, which is consistent with what LST predicts. Arrest and conviction raise the awareness of capable guardianship within a given space to the highest levels, particularly if they were detected by or reported to law enforcement due to their engagement in that space, greatly influencing the risk/reward calculation for the individual arrested. This is enhanced by the use of monitoring software in probation situations (Elliott & Zajac, 2014), though if there is a lack of understanding of the offender's lawless space choices it can be ineffective (i.e. installing software on the offender's laptop may just drive them to use their mobile phone).

The removal of the content from the offender, as well as disrupting their electronic ecosystem may reduce the risk of re-offending. Based on rational choice theory, there are two distinct decision activities - the decision of involvement (the process of engaging in a particular form of crime) and the event decision (deciding to commit a specific crime). Involvement decisions are long term and multi-stage, while event decisions are short term and proximal activities (Clarke & Felson, 2017; Cornish & Clarke, 2014). The requirement that the offender acquire new equipment, reinstall the relevant software for their lawless space of choice, and then re-engage in that lawless space increases the costs by making it again a choice of involvement as opposed to an event choice. If the offender is engaged primarily with social lawless spaces, the differential association that was occurring is attenuated by the time away from those networks, and there may be additional barriers to re-engagement with the disruption of a criminal social network. Any normalization that occurred due to the constant interaction is likely to be attenuated over time as well, further increasing the barrier to re-entry.

Based on lawless space theory, the permanent seizure of any technologies used to consume CSEM is supported. Allowing an offender to keep their ecosystem, or to retain even a single image (through the non-comprehensive execution of a warrant, for example), can make future offending an event-based decision. Similarly, understanding what ecosystem an offender utilizes allows for targeted probation restrictions on the use of enabling technologies. Selectively banning an offender from using peer-to-peer software or from engaging on particular message boards creates higher technological and psychological re-entry costs for new offending behaviour.

When CSEM offenders are arrested, they are forced to confront the consequences of their actions (or at least the personal consequences) directly. In theory, this can lead to a rapid and catastrophic collapse of the protective cognitions they previously used to manage dissonance. As a result, they experience increased strain and may be at increased proximal risk for suicide (Zhang & Lester, 2008). As such, investigative protocols should include activities to reduce the proximal suicide risk in offenders.

4.4. Test methodology

While utility, as noted above, is important for a theory of offending, validity is equally important. The theoretical basis for LST was previously provided, but to be valid the theory must also be testable and falsifiable. A testing methodology for LST has two components - showing that offenders (or non-offenders) view the Internet or spaces within the Internet as lawless, and showing that the individual components of the theory can be empirically tested and validated. A proposed methodology for doing so is presented briefly below.

First, to test that the Internet is perceived as lawless, a validated scale must be developed. The scale should evaluate the views of the Internet as being a separate and distinct ecological niche from the physical world, having lower capable guardianship, and being a location where criminality occurs and is tolerated. The following scale, using a seven-point Likert measurement of agreement, is proposed to measure that perception:

1. The rules of behaviour on the Internet are different from the physical world
2. There is more criminal behaviour on the Internet than in the physical world
3. You can get away with behaviour on the Internet that would be unacceptable in the physical world
4. It is easier to find illegal goods and services on the Internet than in the physical world
5. Most activity on the Internet is not monitored by law enforcement
6. Law enforcement cares less about Internet crimes than crimes in the physical world

If spaces on the Internet are viewed as lawless, the individual components of the theory can be tested.

The first theory component states that offenders will primarily choose and utilize a perceived lawless space that best meets their psychosocial and criminogenic needs in the most frictionless way. This can be tested directly through application usage paradigms. CSEM offenders can be asked how they chose a particular lawless space, and what features were important to them. These features should include both psychosocial features (e.g., the availability of content of interest) as well as both time-based friction costs (e.g., the ability to use the space) and psychological friction costs (e.g., perceived anonymity). Features from both categories should occur and have roughly equal weighting.

To test the second component of the theory, that habituation and differential association in the lawless space will reduce the perceived risk, time-based changes to perceived risk needs to be measured. This is difficult to measure directly as it would require a longitudinal study of individuals who were currently offending and had not been caught, and any observations indicating to them that they were being observed, even for research, would alter the results. Instead, a proxy measure can be used - an escalation of offending behaviour over time. Preliminary work by Fortin and Proulx (2019) supports this aspect, showing that, when looking at image collections for 40 individuals over time, the most common trend was an escalation of problematic usage evidenced by viewing of younger individuals involved in more severe sexual activities.

The third theory component, that normalization occurs and friction costs must be overcome to change lawless spaces, can be evaluated by looking at the entry-level lawless spaces, as well as the switching rates between spaces. Under LST, most individuals should first make use of spaces that are lower risk and have lower costs of entry (e.g., peer-to-peer and web-based spaces). The historical usage of lawless spaces by long-term offenders can be asked, and their preferred space compared to their initial space, preferably in the context of their offending behaviours within those spaces (Glasgow, 2010). LST predicts that most individuals will stay with their first space, and will continue to use that space as their primary space even if they branch out to other spaces to meet additional psychosocial needs. Because no one space is likely to

meet all of the varying psychosocial needs of all users, a substantial minority of users are predicted to evince multi-space usage. Additionally, as general user behaviour changes, new spaces will be created which may become gateways for new CSEM offenders or provide benefits substantial enough to overcome the friction costs of switching for current CSEM offenders.

The final theory component, that additional countermeasures will only be implemented by offenders to reduce perceived risk and lower cognitive dissonance, but not at the expense of utility, can be evaluated by measuring the overall countermeasure usage, particularly that of low-cost but effective countermeasures such as encryption in an offending population. Prior work has already supported this through the low overall adoption rate of encryption by offenders over multiple time periods (Steel et al., 2020a), and further work can be done to confirm that the majority of offenders do not use encryption, and that adoption of more complex lawless spaces with built-in countermeasures (e.g., Tor) but lower variety of and ability to rapidly obtain content will be less frequently used than simpler spaces with more content but fewer protections (e.g., peer-to-peer spaces). The reasons for countermeasure usage can also be measured - offenders can be asked why they implemented particular countermeasures, and LST predicts the reasons would be for both reducing anxiety and frustrating efforts at detection.

4.5. Limitations and generalizability

LST was proposed to explain the influences of a technological ecosystem on the behaviours of cyber offenders, and presented through the lens of CSEM offending. It is not a macro theory of CSEM offending like ITSO or MFM (Seto, 2019; Ward & Beech, 2016), and does not address key issues of offender behaviour, such as how (and why) offenders develop an interest in paedophilic and/or hebephilic content (or choose to engage in criminality more generally) or what leads to certain individuals to cross-over contact offending. Additionally, LST does not seek to explain the behaviours of CSEM offenders in the pre-digital age. Finally, and most importantly, LST does not posit that virtual lawless spaces *cause* criminal behaviour directly, only that they facilitate and reinforce that behaviour within specific individuals that choose those spaces, deviating from theories such as the popular “broken windows” theory (Wilson & Kelling, 1982), which has been criticized for attributing causation and for lack of empirical evidence in large scale studies (Harcourt & Ludwig, 2006).

While LST is examined in this paper through the behaviours of CSEM offenders, it is potentially generalizable to other cyber offenders (the needs described in this paper are primarily psychosexual, but other cyber offender types will have different psychosocial and criminogenic needs). As an example, “carders”, individuals that trade stolen credit cards in cyberspace, frequently use darknet forums. These forums have all of the features of a lawless ecosystem - they have direct psychosocial value based on reputation (Motoyama et al., 2011) that provide convenient features, provide normative reinforcement for criminal behaviours (van Hardeveld et al., 2016), and show stickiness of usage over time despite higher risks based on actual (but not necessarily perceived) presence of law enforcement (Yip et al., 2013). Additionally, some of the same drivers presented related to CSEM offending such as novelty seeking have been evinced in other cybercriminals such as hackers (Ooi et al., 2012). The same analysis methodology presented for CSEM could potentially be applied to malware developers, breach data traders, and botnet vendors.

5. Conclusions

Current theories of online CSEM offending are a subset of sex offender, criminological, neuroeconomic, and behavioural theories. This work introduced LST, which is consistent with earlier macro theories but provides a focused lens on the technology choices and behaviours of cyber offenders. Specifically, LST states that for CSEM offenders

psychosexual needs are the primary driver behind the choice of a technological ecosystem, and that habituation and differential association reinforce that choice. This leads to normalization, which increases the psychological costs to switching ecosystems. Although it would make economic sense to broadly employ countermeasures such as encryption, CSEM offenders do so only when it serves a psychological, as opposed to a purely criminological precautionary, need.

While the basis for the general theory has been established based on existing work, additional research is needed to quantify areas of LST. The specific psychosocial needs of offenders and how those map to the choice of lawless spaces should be further explored. Additionally, longitudinal studies on the changes in technology usage by individual CSEM offenders, as opposed to population changes, would provide additional clarity on the criteria and direction of changes. Although the theory is presented as related to CSEM offences, it is a more general theory of cyber criminology and potentially generalizable to other online activities such as digital piracy and digital identity theft as future work.

Declaration of competing interest

The authors have no conflicts of interest

Data availability

No data was used for the research described in the article.

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