



Australian Government

Australian Institute of Criminology

Trends & issues in crime and criminal justice

No. 639 October 2021

Abstract | Live streaming of child sexual abuse presents challenges for law enforcement and policy development. This study analysed chat logs from seven offenders who watched and directed the sexual abuse of 74 children (mostly in the Philippines) via live stream. The study found that offenders paid facilitators and victims very small amounts of money (median A\$51) to view the sexual abuse of children, and used mainstream messaging and video platforms (eg Facebook) to communicate and transmit the abusive materials.

Two key factors emerged from this study that present potential points for intervention and disruption: payment characteristics (such as price ranges and the use of remittance services) and messaging platforms where offenders view CSA live streaming.

Live streaming of child sexual abuse: An analysis of offender chat logs

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Warning: this paper contains graphic descriptions of child sexual abuse.

Live streaming of child sexual abuse (CSA) involves broadcasting acts of sexual abuse of children live via webcam to people anywhere in the world (ECPAT International 2017). CSA live streaming is difficult for law enforcement to investigate. Due to the live stream element there is often little evidence that the offence occurred apart from session logs, chat logs and data usage trails, unless one of the parties records the live streamed abuse (Açar 2017; ECPAT International 2018; Europol 2020a; Netclean 2019). CSA live streaming is also difficult to prosecute, as the laws in some countries have not 'caught up' with the unique characteristics of CSA live streaming (Dushi 2020).

Yet there is evidence that these offences are common. In 2013, four researchers from Terre des Hommes Netherlands posed as pre-pubescent Filipino girls on 19 different online chat forums. Over a 10-week period, 20,172 people from 71 different countries asked the researchers to engage in sexually explicit acts (Terre des Hommes 2013). Europol (2020b), in monitoring darknet sites, reported an increase in sharing of child sexual abuse material (CSAM) captured through webcam early in the COVID-19 pandemic (from March to May 2020). This included a category listed on forums as 'live streams'. Europol attributed this increase to offenders moving from contact offending to online offending due to travel restrictions.

Because CSA live streaming is often accompanied by a transaction (Brown, Napier & Smith 2020), this separates it from CSAM and online solicitation offending, for which money is rarely exchanged (DeHart et al. 2017; Europol 2019). Perhaps due to the difficulties associated with identifying, detecting and prosecuting CSA live streaming, there is very limited empirical research available on the characteristics of offenders, offences and victims. Such information is crucial for effective disruption and prevention.

Four studies provide some useful insight into CSA live streaming. The Internet Watch Foundation (2018) conducted an international analysis of over 2,000 image and video captures from CSA live streaming from August to October 2017. These captures were located via a snowball sampling method; URLs were identified through the Internet Watch Foundation's historic dataset of child exploitation sites or by entering key search terms into specified global search engines. The study found that 98 percent of CSA live streaming captures in the sample showed children aged 13 years or younger, and 28 percent showed children aged 10 years or younger. Forty percent of the captures were classified by the Internet Watch Foundation as containing 'serious' sexual abuse, with 18 percent involving the rape and sexual torture of children.

Brown, Napier and Smith (2020) analysed data extracted by the Australian Transaction Reports and Analysis Centre (AUSTRAC) for a sample of 256 Australia-based individuals who sent payments to the Philippines for CSA live streaming. Only 10 percent of these individuals had a recorded sexual offence. Although only limited demographic information was available, the authors found that almost two-thirds of offenders were aged between 50 and 69 years. Occupations of offenders varied, and included, for example, tradesperson (eg gardener, carpenter), computer technician, aged care worker and sales assistant.

Two other studies focusing on the Philippines—one that interviewed two survivors of CSA live streaming, and another that analysed cases of online sexual exploitation of children—found that offenders tended to be males aged over 40 years, often from foreign countries (International Justice Mission 2020; Kuhlmann & Aurén 2015).

The current study

As outlined above, currently there is very little information about CSA live streaming offenders, offences and victims. Previous research has demonstrated the utility of examining the online chat logs of child sex offenders to undertake both qualitative and quantitative analysis (DeHart et al. 2017; Kloess et al. 2017; McManus et al. 2016; Williams, Elliott & Beech 2013). For example, in studies examining online grooming of children, chat logs have provided information about perpetrators' requests for sexual acts and victims' reactions to these (de Tribolet-Hardy, Hill & Habermeyer 2020).

To improve current knowledge of CSA live streaming, the present study analysed chat logs from a sample of detected CSA live streaming offenders to answer the research question: What are the characteristics and nature of detected CSA live streaming offending?

Methodology

Sample

The study was approved by the Australian Institute of Criminology's Human Research Ethics Committee in 2020 as part of a larger body of work. The Australian Federal Police (AFP) provided the Australian Institute of Criminology with chat logs from eight cases involving Australia-based individuals. This was a purposive sample comprising cases the AFP was currently investigating or had previously investigated. The inclusion criterion was that a case had to involve an Australia-based adult who attempted to view CSA live streaming. One case was excluded from the study because the offender engaged in online grooming only (ie they did not request CSA live streaming from the victim), leaving a final sample of seven cases. Previous research has noted the challenges in investigating and proving CSA live streaming offences (ECPAT International 2018). Data were not available on the number of CSA live streaming offenders that have come to the attention of the AFP. Therefore, it was not possible to know what proportion of all offences in Australia the present sample comprised.

The chat logs of six cases occurred between March 2012 and April 2019. The time of the chat logs was unknown in one case (Case 6). The chat logs for two cases (1 and 2) comprised 1,659 and 5,838 pages respectively; the number of pages for cases 3–7 ranged from 3 to 235 pages (3, 6, 22, 12 and 235 pages, respectively). Police briefs were also provided, which included additional information about offending behaviour, criminal offending histories and demographic characteristics within the sample. All offenders were charged, convicted or under investigation for child exploitation offences at the time of the study. Two offenders had previous sexual offence convictions and were registered sex offenders at the time of their arrest. It is unknown whether the remaining five offenders had previous sexual offence histories, as this information was not provided by the AFP.

Although the final sample included only seven offenders, each offender could be in contact with multiple victims or facilitators (see Table 1) at any one point in time and could have committed multiple offences. As such, throughout this report multiple units of analysis are used: offenders, offences and victims (see Table 1 for definitions of these terms).

All seven offenders were male and were aged between 42 and 72 years at the time of their arrest or investigation (median age=58 years). All offenders were living in Australia. Four lived in Victoria and one lived in each of the following states: Queensland, Western Australia and Tasmania.

The relationship status and/or living situation of offenders was available for six of the seven cases. Four offenders were single at the time of the detected offending and one was separated. The remaining offender claimed to be engaged to a woman he regularly sent money to in the Philippines. However, he did not provide police with the name or date of birth of this individual. In regard to their living situations, three offenders lived alone, two lived with their mothers and one lived with his ex-wife and adult stepdaughter at the time of arrest or investigation. Of the five cases where information on offenders' children was available, three offenders had children of their own; in two of these cases, the offenders' children were adults, and in the final case the age of the children was unknown.

Employment information was available for six of the seven offenders either at the time of their offending or prior to their offending. Six offenders were working at the time of their offending and one offender was retired. At least one offender was currently working with children and one had formerly worked with children. Two offenders regularly complained in chat logs of having unstable employment and going through periods of having 'no money'.

As a cohort, the seven offenders were involved in 145 CSA live streaming offences (see Table 1 for definition of an offence). The number of offences per offender across the seven cases ranged from three to 88. However, as shown in Figure 1, one offender committed an unusually high number of offences ($n=88$) compared to other offenders in the study. There was a median of five CSA live streaming offences per offender (Table 2).

Analysis

Because this project was exploratory in nature, analysis of the data was informed by grounded theory and protocols (Charmaz & Belgrave 2012; Glaser 1978). The chat logs were analysed qualitatively in NVivo 10 (QSR International 2014), which allowed the researchers to select segments of text and copy them into themes and subthemes. The data were manually coded by the first two authors using open, selective and theoretical processes (see Glaser 1978). Open coding involved reading the chat logs line by line and applying basic labels to sections of data. Selective coding involved a more detailed analysis of sub-categories and themes. Finally, the authors used theoretical coding to identify links and relationships between codes to develop and link with theory (Thornberg & Charmaz 2013; Urquhart 2012).

Consistent with grounded theory principles, the themes identified through the analysis were primarily emergent—in other words, the analysis was led by the data, rather than attempting to 'fit' the data to pre-existing frameworks and theories. This said, pieces of key information from the chat logs were extracted on the basis that previous literature on CSAM or CSA live streaming had highlighted these as crucial knowledge gaps or areas for future research. This included the characteristics and severity of offending (Internet Watch Foundation 2018; Taylor, Holland & Quayle 2001) and the involvement of, or negotiation with, facilitators (Brown 2016; Kuhlmann & Aurén 2015). At each stage of the coding process, the first two authors discussed preliminary findings and agreed on refinements to the coding framework.

Key quantitative data (eg dates, number of victims, payment method and price) were stored in Microsoft Excel and exported to Stata MP14 for analysis. Definitions of key terms used as part of the analysis of the chat logs are provided in Table 1.

| Table 1: Key definitions | |
|--|---|
| Victim | Child or young person (below the age of 18), usually located in the Philippines, who was abused or referenced/involved in negotiations for CSA live streaming. This would occur either as a result of the victim conversing directly with the offender or being 'offered' to the offender by a facilitator. |
| Chat log | Online discussions between an Australia-based offender and a facilitator and/or victim, mostly located in the Philippines. |
| CSA live streaming offence | An attempt by an offender, either successful or unsuccessful, to watch a child being sexually abused via a live stream video platform. |
| Facilitator (also known as a trafficker) | A person who organises and coordinates the abuse of a child over live stream, and often collects the money from the Australia-based offender. |
| Offender | Australia-based individual who attempts to view CSA live streaming. |

Limitations

We acknowledge the external validity of overall conclusions derived from a sample of seven offenders may be limited. The sample was not representative of all CSA live streaming offenders and may be skewed towards more extreme, higher risk-taking offenders, which may be why these offenders came to the attention of police. It should also be noted that the chat logs analysed for this study were limited to those extracted by police for investigative purposes. These offenders may have engaged in other sexual offending and CSA live streaming that was not detected by police because these activities were not referenced in the provided chat log records. Further, chat logs that were extracted by police but deemed irrelevant for investigative purposes may not have been provided to the researchers. It should also be noted that substantial changes in offending will have occurred since the period covered by this study. For example, Yahoo! Messenger is no longer active and Skype now incorporates end-to-end encryption.

However, the chat logs included a wealth of detailed information that provided valuable insights into the nature of these offences. Further, as these offenders were not aware that their chat logs would be observed, they appeared to be uninhibited in discussing and requesting acts involving the sexual abuse of children. As such, they can be viewed as a reliable source of information about these behaviours, and are less impacted by factors such as social desirability bias which may hamper other forms of data collection, such as surveys and interviews with offenders (McGrath, Cann & Konopasky 1998; Tan & Grace 2008). Finally, previous qualitative studies have made a case for the value of in-depth data rather than breadth of data; given this, small sample sizes can provide rich qualitative data (Halsey & Deegan 2012; Kloess et al. 2017). Overall, the lack of empirical research into the nature of CSA live streaming makes the current study highly valuable, particularly as a starting point for further research to inform policy and prevention.

Results

Characteristics of CSA live streaming victims

Across the 145 offences, a total of 74 unique victims were identified; 43 were located in the Philippines, two each in the United Kingdom and China and one in Thailand. The exact location of 26 victims was not able to be determined from the chat logs. In one case (Case 1) the offender also contacted or attempted to groom children online in the following countries: Australia, Indonesia, Vietnam, Japan and Namibia. All of the victims were female. However, on rare occasions offenders were 'offered' male children by the facilitators. All of these offers were declined. Table 2 displays a summary of the offences across the seven cases.

| Case | Offender age (years) ^a | Offender marital status | Number of victims ^b | Number of live stream offences | Victim age range | Approximate price range per live stream offence ^c | Maximum COPINE level of offence ^d |
|---------------|-----------------------------------|--------------------------|--------------------------------|--------------------------------|--------------------|--|--|
| Case 1 | 42 | Single | 22 | 88 | 12–17 | \$40–\$404 | 9 |
| Case 2 | 49 | Single | 22 ^e | 27 | 8–17 | \$40–\$385 | 10 |
| Case 3 | 67 | Unknown/ living alone | 4 | 3 | 10–16 ^f | \$25–\$75 | 6 |
| Case 4 | 47 | Engaged ^g | 4 | 5 | 7–8 ^h | \$15–\$20 | 10 |
| Case 5 | 72 | Single | 6 | 5 | 14–17 | \$90 | – |
| Case 6 | 62 | Separated | 2 | 5 | 12 ⁱ | \$30–\$65 | 8 |
| Case 7 | 58 | Single | 14 | 12 | 10–14 | \$13–\$50 | 7 |
| Overall range | 42–72 | – | 2–22 | 3–88 | 7–17 | \$13–\$404 | 6–10 |
| Median | 58 | – | 6 | 5 | 14 | \$51 | – |

a: Offender's age at time of arrest or investigation

b: Number of victims of live streaming offences

c: Approximate price per offence converted from Philippine pesos to A\$ in February 2021

d: Type of abuse requested and viewed during live stream, categorised according to the COPINE scale (Taylor, Holland & Quayle 2001); COPINE level not able to be determined for all offenders

e: Police briefs indicated offender engaged in sexual activity with at least 30 Filipina minors, but not all involved CSA live streaming

f: Police briefs indicated offender engaged in live streaming sessions with victims as young as 10, but chat logs examined contained victims aged 16 and of unknown age

g: Offender stated he was engaged to a woman in the Philippines but would not clearly specify to police this woman's name or date of birth

h: Offender requested a child as young as four years but was unable to obtain

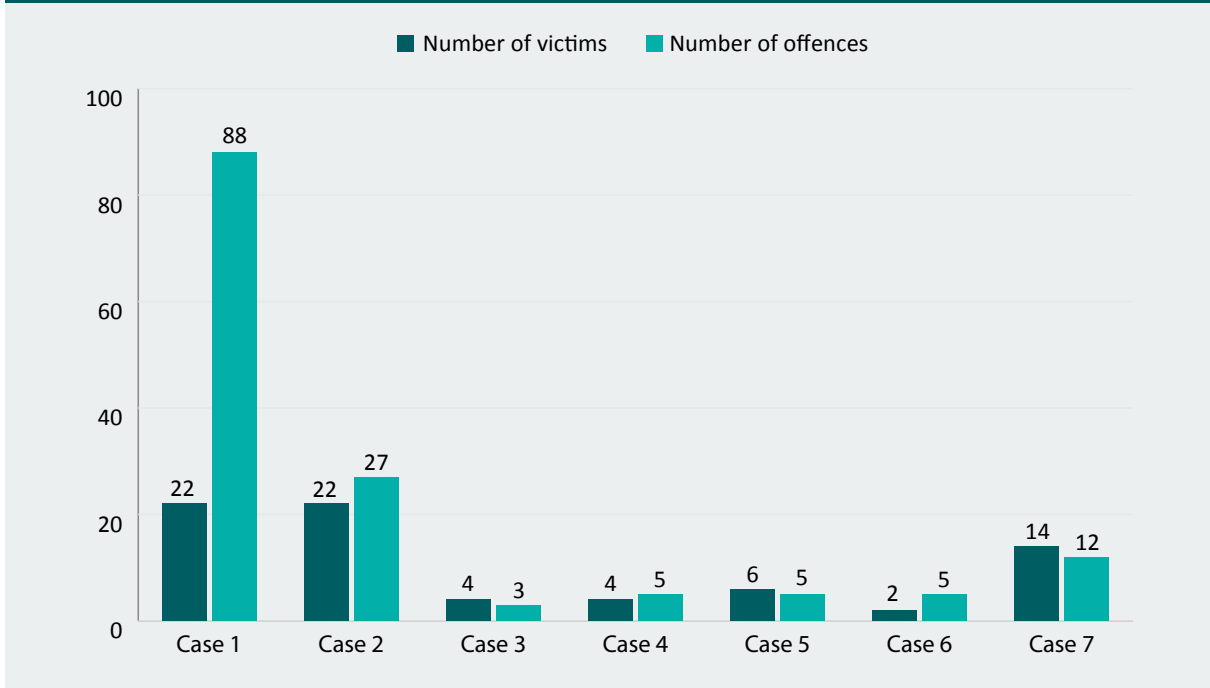
i: Both victims were 12 years old

Source: CSA live streaming dataset [computer file]

The number of victims per offender ranged from two to 22 (median=6). Victim age ranged from seven to 17 years (median=14 years). Five of the seven offenders requested that a CSA live streaming session involve a victim of a specific age. The youngest age requested by an offender was four, but this offender was told by the facilitator that no four-year-old children were available at the time. Two offenders in the study also paid to watch adult females engage in sexually explicit acts via webcam.

When comparing the number of victims and the number of offences observed in each case, it was evident that some victims may have been abused on multiple occasions (ie experienced repeat victimisation). For example, in Case 1 there were 88 offences and 22 victims; in Case 2 there were 27 offences and 22 victims (Figure 1).

Figure 1: CSA live streaming offences and identified victims, by offender (n)



Note: Cases with more offences than victims indicate repeat victimisation of the same victim. Cases with more victims than offences indicate some CSA live streaming offences involved more than one victim

Source: CSA live streaming dataset [computer file]

Offence characteristics

Involvement of facilitators

In all seven cases that were the focus of this study, the Australia-based offender communicated with an adult facilitator to arrange the CSA live streaming in at least one offence. Across all offences ($n=145$), facilitators were involved in 51 offences. In the remaining offences where facilitators were not involved ($n=94$), the Australia-based offenders communicated directly with and paid the victims. However, it should be noted that two of the seven offenders (cases 1 and 2) committed the majority of CSA live streaming offences across the sample (79%, $n=115$) and also typically contacted victims directly, which skewed the results. When excluding these two cases, the remaining five offenders together committed 30 CSA live streaming offences, the vast majority of which (80%, $n=24$) involved a facilitator. Facilitators did not always provide the offender with the same child for CSA live streaming; in some cases, they provided different children on different occasions. Victims and facilitators often spoke in chat logs of needing money for food, clothes and school tuition. We will discuss the characteristics of facilitators in a separate forthcoming paper.

Platforms used for CSA live streaming

Offenders used a range of platforms to communicate with victims or facilitators prior to CSA live streaming sessions taking place (information was available for six cases). As shown in Table 3, Facebook and Yahoo! Messenger were the most common platforms used for chatting with victims and facilitators (both used by four out of six offenders).

To view CSA live streaming, offenders frequently used Facebook, Yahoo! Messenger, Skype and Viber (information was available for five cases). Yahoo! Messenger was the most common platform used, with four out of five offenders using this to view CSA live streaming (Table 3).

In some cases, the offender would begin chatting with a victim or facilitator on one platform and request to switch platforms to view the CSA live stream 'show'. In other cases the victim or facilitator would ask to switch platforms. In one case dating back to 2012 (Case 4), the offender often began chatting with facilitators and victims on Facebook, then would switch to Yahoo! Messenger for CSA live streaming. It should be noted that Facebook did not introduce video calls until 2015 (Chudnovsky & Reddy 2015), while Yahoo introduced them in 2008. Also of note is that Yahoo shut down its messenger service completely in 2018 (Wolfe 2018). The availability of video functions likely influenced the choice of platforms used by offenders. Platforms used by online child sexual offenders have changed over time, and the variety and relative modernity of the platforms indicated in Table 3 are associated with the time period in which the offences occurred. However, previous research has found that online child sex offenders use a mixture of both newer and more dated technology to offend (Balfe et al. 2015). Therefore, despite newer technologies being used by some offenders, it is possible that older technologies, such as those listed in Table 3, may still be used by offenders.

Table 3: Platforms used for online chat with victims/facilitators and CSA live streaming

| Case | Platforms used for chat | Platforms used for CSA live streaming | Date range of chat logs |
|--------|---|---|-------------------------|
| Case 1 | Facebook Messenger, Skype, Viber | Skype | 4/2/2012 – 19/7/2014 |
| Case 2 | Yahoo! Messenger, Facebook Messenger, Viber | Yahoo! Messenger, Viber, Facebook Messenger | 18/3/2013 – 19/1/2016 |
| Case 3 | Yahoo! Messenger | Yahoo! Messenger | Unknown – 1/4/2014 |
| Case 4 | Yahoo! Messenger, Facebook Messenger | Yahoo! Messenger | Unknown – 16/6/2012 |
| Case 5 | Facebook Messenger, Skype | N/A ^a | Unknown – 25/4/2019 |
| Case 6 | Unknown | Unknown | Unknown |
| Case 7 | Yahoo! Messenger | Yahoo! Messenger, Skype | 31/8/2014 – 28/11/2014 |

a: Case 5 was an unsuccessful live streaming attempt

Source: CSA live streaming dataset [computer file]

Methods of payment

Offenders usually discussed the price and method of payment for CSA live streaming sessions with victims or facilitators during the online chat, prior to the offence taking place. While some offenders used multiple methods of payment, Western Union ($n=4$) and WorldRemit ($n=3$) were most commonly used for payment for CSA live streaming sessions, followed by Remitly ($n=1$). In one case (Case 2), the offender indicated they were banned from one remittance service, and simply used another service. Often the payment method was dictated by the victim or facilitator, who had a preferred service. In another case (Case 1), the facilitator provided the offender with detailed information on how to create an account with and use a remittance service. Once payment was transferred, victims and facilitators would collect the money at locations in the Philippines, such as financial services and pawn shops.

Usually, the facilitator or victim would negotiate with the offender over the price and type of sexual abuse to be viewed. Once both parties agreed on these factors, the offender would send the facilitator or victim proof they had transferred the money, such as a transaction number (see Table 4 for an example). It was common for the CSA live streaming session to commence immediately after this. However, in some cases the live streaming took place several days after payment, and sometimes did not take place at all.

Table 4: A 58-year-old offender paying a facilitator

The following is an excerpt of the chat log from Case 7.

| | |
|--------------|--|
| Facilitator: | how much u send now for young [children] show |
| Offender: | i want to see there faces first....and not under 12...ok..?? |
| Facilitator: | ok how much u send |
| Offender: | 1000..... [Philippine pesos] [Offender agrees to view two victims aged 12 and 13 years] ok...sent....[provides transaction number]amount is 1000...from [offender's name] from Australia you should get an sms soon |
| Facilitator: | ok |

Price and severity of offending

As shown in Table 2, the lowest price that offenders in the study paid for CSA live streaming was approximately A\$13 (all price conversions calculated from Philippine pesos in February 2021). The maximum price offenders paid was A\$404; this was an unusually large payment which was made with a promise to the offender of 'lifetime shows' of CSA live streaming, although the chat logs indicated the offender did not receive a single 'show' from this facilitator. The median price offenders paid was A\$51. While in most cases it was clear how much an offender paid for a single CSA live streaming session, in three cases (cases 1, 2 and 5) the offenders regularly sent money at the request of facilitators or victims for school, bills, food and clothes, as well as devices to facilitate live streaming. While these one-off payments did not always result in a CSA live streaming session, several regular payments for these items would often result in a CSA live streaming session.

The Combating Paedophile Networks in Europe (COPINE) scale measures the severity of child sexual abuse offences (Taylor, Holland & Quayle 2001). The type of abuse requested or viewed was evident for offences in five out of seven cases and the maximum COPINE score was recorded for each offender. In cases 3, 7 and 6 respectively, offenders requested or viewed abuse up to COPINE level 6 (explicit erotic posing emphasising genital areas of children, naked or clothed), level 7 (touching, mutual and self-masturbation, oral sex and intercourse by another child, not involving an adult) and level 8 (sexual assault of child involving digital touching by an adult). In cases 2 and 4 offenders requested or viewed abuse up to level 10 (children being tied, bound, beaten, whipped or otherwise subject to something that involves pain; see Table 2). Bestiality with a child (also level 10) was requested by one offender in the sample; however, it was unclear whether or not this request was fulfilled.

In two cases, the price per session increased when younger victims were requested. In one of these, the offender asked to watch a 12-year-old female being tied up, blindfolded and raped by an adult male (Case 2). The facilitator responded that this would cost 10,000 pesos (A\$294), whereas the offender had previously been paying A\$29–\$59 to watch children aged 14 years being sexually abused with no adults involved. The offender agreed to pay the A\$294; however, it is unclear whether or not he paid this money or if the act he requested took place.

However, more severe abuse and younger victims did not always result in a higher price. There was substantial variation in the prices allocated to specific abusive acts or victim ages across facilitators and victims. This indicates that more severe abuse and younger victims were not always associated with higher prices paid by offenders. In a particularly severe case, the offender asked to view a ‘nasty’ and ‘brutal’ rape of an eight-year-old girl’s anus and throat by an adult male, paying only A\$15 for this (Case 4). It was clear from the chat logs that this act took place.

In some offences the price increased with the number of victims. For example, in one case (Case 6) the offender paid A\$32 to watch one victim being abused, and subsequently paid A\$58 to watch two victims being abused. Again, however, this price change was not consistent across victims/facilitators or offences.

Outcomes of offences

Information about the actual outcome of the offence was available for only 41 offences. Of the 41 offences, 17 were successful (ie the offender viewed CSA live streaming) and 24 were unsuccessful (ie the offender did not view a ‘show’, usually because they had been scammed). In the other 104 offences, it was unclear whether the offender had viewed the session or not. This may be attributable to the offender switching to another platform or continuing the conversation over live stream.

Discussion

To the authors’ knowledge, this is the first study to analyse chat logs from individuals who view, direct and pay for live streaming of child sexual abuse. A key benefit of chat log analysis is that it facilitates the collection of information about offending behaviour when the offender is unaware that they are being observed. The brutality of some of the language used by offenders in this study regarding how they wanted children in the Philippines to be abused as they watched is testament to this point.

The study analysed chat logs from seven offenders who committed 145 CSA live streaming offences. Only about one-third (35%) of offences involved a facilitator, although this result was skewed by two offenders who committed the majority of offences ($n=115$) and tended to contact and pay victims directly. The remaining five offenders arranged CSA live streaming via a facilitator in the majority of their offences. The median age of offenders in the present study was 58 years. Although the study used a small, unrepresentative sample of offenders, this finding aligns with the age of CSA live streaming offenders reported in two previous studies (Brown, Napier & Smith 2020; Kuhlmann & Aurén 2015). Brown, Napier and Smith (2020), while acknowledging that their sample was not representative, noted that the CSA live streaming offenders in their study were older than arrested or convicted CSAM offenders found in previous research.

The present study found that offenders viewed the abuse of children on widely used video-chat platforms—Yahoo! Messenger, Skype, Facebook and Viber—and the severity of abuse requested and viewed by offenders ranged from COPINE category 6, involving explicit erotic posing, to category 10, involving sadistic abuse and sexual assault of children. The median price paid by Australia-based offenders to watch a child being sexually abused was equivalent to A\$51 in February 2021. This low price aligns with previous reports that CSA live streaming can be purchased for very small amounts (ECPAT International 2017; EFC 2015). However, the price was slightly lower than the A\$78 median reported by Brown, Napier and Smith (2020), who analysed a sample of 2,714 CSA live streaming transactions.

Facilitators and victims appeared to prefer receiving funds for the abuse via remittance services, as the cash could be collected almost instantly. It has been noted that the Philippines has well-established remittance services (ECPAT International 2017). In addition, remittance services do not require the sophistication of encrypted transactions, such as cryptocurrencies, which may be beyond the resource capabilities of many facilitators and child victims, who sell these online abusive services for basic living necessities.

The payment that usually accompanies CSA live streaming differentiates this crime type from online solicitation offending, which rarely involves the offender paying the victim (DeHart et al. 2017). In a minority of offences, the price of CSA live streaming increased when the offender requested more severe abuse (as defined by the COPINE scale) and younger or more victims (as suggested by Brown, Napier & Smith 2020). However, this was not always the case; one of the lowest prices paid by an offender in the study was A\$15 for viewing abuse that fell into COPINE category 10 and involved sadistic sexual assault of an eight-year-old child.

Research has suggested that extreme poverty may be a driver of CSA live streaming (ECPAT International 2017; Kuhlmann & Aurén 2015). The data in the current study provide some support for this, with victims and facilitators often telling the offenders they needed money for food, clothes and school tuition. The Philippines Statistics Authority (2018) estimates that, in 2018, 17 percent of the population (approximately 17.7 million people) in the Philippines had insufficient income to meet their basic food and non-food needs. Therefore, it is likely that poverty experienced by victims and facilitators contributed to the occurrence of CSA live streaming described in the chat logs.

The findings from this study have two key implications for policy, law enforcement and the financial sector. Firstly, there are distinctive characteristics of CSA live streaming transactions—they are under A\$100, they take place via remittance services, and payments are sent to vulnerable countries. Any of these alone is not a strong indication of child exploitation or CSA live streaming; however, these multiple characteristics could be considered by financial institutions and law enforcement agencies when using sophisticated techniques, such as machine learning, to flag suspicious transactions for further investigation.

Secondly, the use of such popular platforms to arrange and watch the sexual abuse of children live has implications for 'big tech' companies in implementing more measures to prevent child abuse and exploitation from taking place on their platforms. While recent research has examined individuals who engage in online child sexual offences on the darknet (Leclerc et al. 2021; Woodhams et al. 2021), all 145 CSA live streaming offences in the present study occurred on the open web on popular platforms. Such offences could potentially be traceable by these companies if they invested in more innovative technology. Yet the end-to-end encryption proposed on platforms such as Facebook (Hunter 2019) will likely increase the challenges for law enforcement in detecting new and emerging forms of child exploitation. For example, such encryption will prevent police from accessing online chat logs, which are a key form of evidence in the investigation of CSA live streaming. This suggests a need for international law reform in the regulation and accountability of popular online messaging platforms to prevent and detect CSA live streaming. This is particularly important given Europol suggests that 'if air travel remains limited for the foreseeable future however, or becomes more expensive, it is also possible we will see an increase in virtual and proxy offending via live streaming' (Europol 2020b: 17).

Conclusion

With little evidence available for investigation and prosecution, live streaming of child sexual abuse presents challenges for law enforcement and policy development. However, two key factors emerged from this study that present potential points for intervention and disruption: (1) characteristics such as price ranges and the use of remittance services; and (2) law reform regarding online messaging platforms with which offenders commit their offences. Individuals in law enforcement, finance and policy aiming to reduce online child exploitation could focus on these two areas to help detect and prevent CSA live streaming in the future.

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General editor, *Trends & issues in crime and criminal justice* series: Dr Rick Brown, Deputy Director, Australian Institute of Criminology. Note: *Trends & issues in crime and criminal justice* papers are peer reviewed. For a complete list and the full text of the papers in the *Trends & issues in crime and criminal justice* series, visit the AIC website at: aic.gov.au

ISSN 1836-2206 (Online) ISBN: 978 1 922478 37 5 (Online)
<https://doi.org/10.52922/ti78375>

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