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Shadows into Light: The Investigative Utility of Voice Analysis with Two Types of Online Child-Sex Predators

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ABSTRACT

Over 390,000 child sexual abuse victims in the United States have not yet been identified. Due to the increased prevalence of Internet-driven child-sex offenders (e.g., child pornographers and travelers), detection becomes more elusive, and disclosure elicitations are more challenging for law enforcement. The current study examines an innovative, investigative method of voice stress analysis use, and describes its effectiveness in identifying previously undetected sexual offending within these two offender populations. In the total sample of 82 suspects with no known history of "hands-on" sexual offending, 0% initially admitted to sexually abusing at least one child. However, as a result of voice stress analysis procedures, 40.2% of the suspect pool (57.1% of child pornographers and 36.7% of travelers) provided admissions to hands-on offenses. Also, 80.5% admitted to at least one sex crime offense during the pre and posttest stages of the investigation. Compellingly, 100% of voice stress analysis "Stress Indicated" examinations resulted in verifiable disclosures (of victims and sex crimes). Critically, as a result of voice stress analysis procedures, 87 previously undiscovered live victims were identified. Finally, this study's description of specific characteristics and predictive qualities of victimizers vs. non-victimizers in each offender-type should benefit future investigators, researchers, and therapists alike.

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In the USA, as of 2018, more than 904,011 convicted sex offenders registered their whereabouts with local law enforcement in every state (National Center for Missing and Exploited Children, 2018). Of this number, over 400,000 are registered child sex abusers (Gaudette, 2017). Although in recent years, roughly 78,000 children per year become sexual abuse victims (Finkelhor, 2009), this estimate only represents the cases reported to authorities. Considering the approximate 80% unreported rate of child sex abuse cases (The Children's Assessment Center, 2016), this equates to at least 390,000 child victims in the USA who have still not been identified, with their offenders left undetected (Darkness to Light, 2015).

Although the number of online sexual offense cases is still a small fragment of real-world child exploitation and abuse cases (Wolak, Finkelhor, & Mitchell,

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2009), and in contrast to the downturn in traditional sexual offending against children, online sexual offending is likely to continue to increase as more of the world goes online, and Internet access increasingly become a part of our citizens' daily lives. From the origins of the World Wide Web in the early 1990s to the present, there are now over two billion users (Internet World Stats, 2018). The transformative and ubiquitous capacity of the Internet for connecting people via accelerated communication has also been the case for criminal behavior, with increasing concerns about online harassment, and digital distribution of illegal pornography, particularly child pornography. Although it is challenging to determine whether the Internet encourages potential sexual predators to act on otherwise dormant impulses, or whether it facilitates activities of predators who have already established histories of offending (McGrath & Casey, 2002), one thing is unfortunately clear: a new generation of offenders and victims has been born. Though there are challenges to legally defining "child pornography" (e.g., the types of content included or distinguishing between developmental age categories), currently, North American laws define it as "Any visual depictions of sexually explicit conduct of persons under the age of 18". The latter is equivalent to saying that images of sexually mature people under the age of 18 who are at or above the legal age of consent for sex are considered to be the same as images of young adolescents, pubescent-aged children, or pre-pubescent children. However, to compensate for this, in the USA, child age is often indirectly proportional to sentencing terms (e.g., federal sentencing guidelines recommend longer sentencing for images of younger children) (Seto, 2013).

The "traveler" (also referred to as minor "luring" or "online solicitation" offender) classification is a relatively new type of offense, defined as "an adult who uses Internet technologies (e.g., social networking sites, chat rooms, instant messaging, e-mails) to approach children and youths and solicit them to engage in activities such as sexual chat, exchange of sexually explicit images, or to meet in person so that a contact sexual offense can be committed" (Seto, 2013; Whittle, Hamilton-Giachritsis, Beech, & Collings, 2013).

To date, most prosecutions of Internet-facilitated sexual offending have been for child pornography offenses. Increasingly, individuals are being apprehended and prosecuted for sexual solicitation of minors, due to the implementation of laws criminalizing communication with children through the Internet to commit a sexual offense (Seto, 2013). National arrest estimates reveal that child pornography cases tripled from 2001 to 2009. The number of online luring cases has also increased during the same period (Wolak et al., 2009). In the USA, online cases represent about 10% of the total number of sexual offense cases which might reflect (1) political and law enforcement priorities (Seto, 2013) and (2) the fact that these predators are challenging to detect. For instance, between 2007 and 2013, of the 4,462-child pornography federal cases, 23.6% who admitted to "contact" behaviors, only 12% had prior arrests for sexual assault or exploitation (Cohen & Spidell, 2016).

According to The Global Study Report on Sexual Exploitation of Children in Travel and Tourism (SECTT), the number of convictions remains alarmingly low. On a global level, many criminals offend or facilitate the crime and do not face the consequences because of a chronic lack of reporting by all stakeholders (witnesses, victims and their families), and limited cooperation among national law enforcement agencies, which results in weak legislation and law enforcement. Many offenders enjoy impunity through bribing their way out of investigations or prosecutions, a lack of empathy and social distancing by the general public, resulting in little pressure on governments to investigate and prosecute offenders aggressively. Lack of data related to the accurate scale, scope, and nature of Sexual Exploitation of Children in Travel and Tourism has also contributed to globally low prosecution rates. Hence, it is crucial that law enforcement professionals properly interview and obtain information regarding victims directly from sex offenders themselves (Hawke & Raphael, 2016).

Offender admissions are often the only reliable way to prove guilt. A veritable art form, interviewing a sex offender is very different from parleying suspects of other crimes types (e.g., bank robbery, murder, narcotics). For detectives and law enforcement personnel, it can be particularly frustrating to have ensnared child sex predators, who intentionally withhold essential information that could lead to not just one, but several victims. There are three key benefits to an online sex offender confessing: an increased likelihood of a conviction, the decreased likelihood of a victim being required to testify, and the reduction in costs associated with a lengthy trial and prosecution. It is not easy to either prove or resolve a sexual assault case, with the offender's story often pitted against victim accounts. Physical evidence is not a consistently reliable source of corroboration and is often highly dependent on time constraints (Beauregard, Busina, & Healey, 2017). Clinician profiling testimonies are often neither valid nor reliable enough to use in criminal trials (Murphy & Peters, 1992). Adding to the pressure, when apprehended and investigated, travelers are less likely than child pornographers to admit to undetected contact offenses (including pedophilia or hebephilia) when interviewed (Seto, 2013).

One of the distinguishing features of sex offenders who communicate with investigators is offenders' ample use of five minimization strategies while being interviewed: diminishing the offense severity (denial, distortions), victim-blaming, attempting to control the interview, never talking about crimes the investigator doesn't already know about, and not providing 100% of the information regarding the offense. In several documented studies, offenders have suggested that for police officers to increase the likelihood of a guilty suspect confessing, more accurate evidence-presenting approaches should be employed. Whereas eyewitness evidence is mostly ineffective against eliciting confessions, the strategies that have historically worked are minimization and maximization, ethical approaches, and an

understanding of cognitive distortions (Howell, 2014; Jensen & Krummenacker, 2017; Nunes & Jung, 2012).

The establishment of rapport and humane methods of interviewing can help gain disclosures (Kebbell, Hurren, & Mazerolle, 2006). Finally, specific offender profiles are related to the higher likelihood of confession during the interrogation (Beauregard et al., 2017). The provision and combinatorial use of specific investigative methods, such as advanced interview techniques, as well as profile-specific interview strategies are essential for investigators who are seeking to obtain disclosures from online sex offenders.

The data contained in this paper originates from a southeastern US Internet Crimes Against Children (ICAC) Task Force, an organization that successfully uses both advanced interviewing techniques and investigative tools when eliciting disclosures. Launched in 1998 to help federal, state, and law enforcement agencies enhance their investigative responses to offenders who use the Internet, online communication systems or computer technology to exploit children, the ICAC Program is funded through the Office of Juvenile Justice and Delinquency Prevention (OJJDP). Currently, in the USA, there are 61 ICAC task force units, located in all 50 states and comprised of more than 4,500 federal, state, local and tribal law enforcement agencies. To date, ICAC Task Forces have reviewed more than 775,000 complaints of child exploitation, which have culminated in the arrest of more than 83,000 individuals. Also, since the ICAC program's start, over 629,400 law enforcement officers, prosecutors and related professionals have been trained in various approaches and procedures when searching out, examining, and prosecuting ICAC-related cases (U.S. Department of Justice, 2018).

The primary purpose of this paper is to explore the efficacy of Computerized Voice Stress Analyzer (CVSA), a unique and innovative investigative tool that has recently been used in ICAC task force cases, to obtain critical offense information from online child sex malefactors, including: admissions, confessions and the identification of victims. The secondary purpose is to contribute to the existing literature by providing a comparative analysis between the two types of online predators investigated (i.e., travelers and child pornographers), such that law enforcement personnel and researchers are better equipped in their future investigative efforts.

Method

Investigative tool

The CVSA is a truth verification technology widely used by over 2,000 U.S. and international law enforcement agencies (NITV, 2018). Although a description of the CVSA tool and examination process, described elsewhere (Chapman &

Stathis, 2012) is beyond the scope of the current paper, it is critical to note that the intent of "typical" CVSA examinations is to gain admissions or confessions from guilty individuals regarding the matter under investigation. Relevant to the cases represented in this study, each CVSA examination was administered quickly after the point of the first contact with a suspect, to gather immediately actionable information.

Binary results

CVSA examinations in the current study resulted in one of two determinations: No Stress Indicated (NSI), or Stress Indicated (SI). Although there would have been no consequences for suspects who obtained SI results, but did not make subsequent disclosures, every single SI suspect made some admission [e.g., either a first or additional disclosure with respect to a sex crime or victimization(s)]. In every single case, the investigator determined whether the responses were veracious (i.e., there are no inconclusive results with the CVSA test).

Interview phases

For both child pornography and traveler suspects, the interview process consisted of four distinct phases: an initial non-CVSA interview, a CVSA pretest interview, the CVSA test, and a CVSA posttest interview. Immediately after an arrest, law enforcement personnel conducted the initial interviews and primarily addressed suspects' possession and distribution of child pornography, whether images were sent to a minor, and any current or historical hands-on victimization of children. After the initial interview, law enforcement offered each suspect a CVSA examination focused on specific sex-crimes, including questions about the hands-on victimization of children. Contingent upon the individual's voluntary consent, a pretest interview was conducted by the CVSA Examiner immediately before the CVSA examination to determine suitability for testing, biographical history, and participation in the sexual abuse of minors. If during the CVSA examination process, any question relating to possession of child pornography, sending of nude images to a child or hands-on sexual abuse produced an "SI" result, the same examiner conducted a posttest interview upon completion of the CVSA exam.

Systematic approach

The CVSA procedure for the task force which provided the data was consistent, in that all suspects underwent CVSA examinations on the day they were arrested and within a specific time frame post-arrest: 20–25 minutes

for travelers, 45 minutes for child pornographers (The agency recorded hands-on disclosures at two of the four phases (i.e., pretest interview, posttest interview). No disclosures occurred during the initial interview, before the initiation of the CVSA examination process, as well as during the CVSA exam. In this study, we define hands-on offenses as "penetrative sexual acts, as well as the touching of a child's genitals or breasts above or below his or her clothing for sexual gratification"; we did not include acts that involved unintentional contact that caused the offender to become aroused, nor incidents of frottage (the practice of touching or rubbing against the clothed body of a non-consenting person for sexual gratification).

Interview foci

The interview approaches and questions varied, depending on whether child pornography or traveler suspects were interrogated. Child pornography suspects were arrested based on evidence of visual depictions of sexually explicit conduct of minors. Since the images for which they were arrested demonstrated their sexual attraction to children, the goal of the post-arrest interrogation was to determine whether their attraction(s) had progressed to the point of criminal conduct or resulted in other sexual crimes against children. Therefore, the foci of child pornography suspect interviews were on determining if there were live victims (i.e., whether they had ever engaged in any sexual conduct with a minor). In contrast, traveler suspects were arrested based on evidence from online discussions and meetings (with law enforcement personnel who impersonated minors) during which they demonstrated intent to abuse children sexually. Despite the evidence, most of these individuals denied having any sexual attraction to children and posited excuses for their meeting these minors (e.g., to talk a child out of having sexual relations with strangers from the internet). The foci of traveler suspect interviews were on the possession of child pornography (to validate the sexual attraction to children), the sending of nude images (to validate grooming of children for sexual activity), and sexual contact/activity with a child (to identify live victims). When child erotica collections were evidenced, to determine child-oriented sexual fetishes, interview question themes additionally included the voyeurism of a child, placing an adult's face over a nude child's body in a photographic image, or vice versa.

Data sample

To address the question of whether two populations of online offenders (i.e., child pornography and travelers) had ever sexually abused a child, as well as

to assess the utility of the CVSA technique, secondary data, not originally collected for research purposes, was obtained. The secondary data was a convenience sample of cases that spanned a 2.5-year time frame from one participating ICAC task force and included all suspects who agreed to take a CVSA examination regarding their hands-on activity (n = 82). None of these individuals had been previously arrested for a sexual offense. The crimes for which they were being investigated at the time of their CVSA examination were either a child pornography offense (i.e., possession, receipt, or distribution of child pornography) or a child solicitation offense (i.e., also known as "travelers", or sexual predators who prowl the Internet looking for children, send nude images to children, etc.). No hands-on criminal activity was known to investigators at the time the CVSA examination was offered.

Also, none of the suspects attrited on the day of the examination (e.g., due to request for an attorney, refusal to participate in the offered examination process, exclusion by examiner due to medical or mental faculty). For this analysis, we included all suspects who began the CVSA procedures and had no exclusionary conditions; therefore, the final sample consisted of 82 individuals (100% of sample population arrested from March 2015 to August 2017).

Statistical tests

The analyses that were executed on the data (via use of Microsoft Office Excel 2016 or IBM SBSS Statistics 23 software) included: the Chi-square Test of Independence, the Chi-square goodness of fit test, parametric and non-parametric tests of correlation (i.e., Pearson, Spearman's rho), the Fisher's exact test (± the Freeman-Halton Extension), the Student's t-test, the Bernoulli trials probability, and Multiple Regression.

Results

General demographics

The total study sample consists of n = 82 persons who were under investigation for the sex-crimes of "traveling" (n = 68) or for the possession, receipt, and distribution of "child pornography" (n = 14). In each of the pooled n = 82 cases, the suspect voluntarily agreed to a CVSA examination regarding sex crimes against children or hands-on activity. As concerns the total study sample, we discerned the following: The average age was 35.8 (± 1.6) YOA, with males representing 100% of the suspects investigated. Concerning race or ethnicity, 74.4% were Caucasian, 13.4% were Hispanic, 6% were African-American, 4.9% were Asian, and 1.2% were of Middle-Eastern origin. As regards economic status: 9.8% were wealthy, 79.3% were middle class, 4.9% were blue-collar, and 6.1% were poor. Regarding employment status: 1.2%

were Full-Time business owners, 76.8% worked full-time, 3.7% worked part-time, 4.9% were disabled, 3.7% were retired, 6.1% were unemployed, and 3.7% were high-school students. Relating to the highest education achieved: 1.2% had post-graduate degrees, 18.3% were college graduates, 3.7% had some college background, 70.7% were high-school graduates, 2.4% were high-school graduates with additional certifications, 1.2% had their GED, and 2.4% were high-school dropouts. Of the pooled population, 0% had ever held public office, and 3.7% were indigents. Concerning prior arrests and criminal backgrounds: 1.2% were previously arrested for burglary and domestic battery, 1.2% were arrested for burglary only, 3.7% were arrested for Domestic Battery, and 93.9% had no prior, criminal background, entirely. We underscore the finding that 100% of the n = 82 persons under investigation had never previously been arrested or convicted for sex crimes.

CVSA outcomes

Although CVSA examination results differed across the two offender types (i.e., n = 54 "SI" and n = 14 "NSI" for travelers vs. n = 8 "SI" and n = 6 "NSI" for child pornography), a Chi-square test of Independence revealed no significant differences between the samples [$\chi 2$ (1) = 3.122, p (2-tailed) = 0.077]. When comparing this study's child pornography CVSA outcomes to the child pornography polygraph outcomes of a recently published paper (Bourke et al., 2014), no statistical differences between rates was found [χ^2 (1) = 3.592, p (2-tailed) = 0.058].

A substantial portion of the suspects (59.8%, n = 49) reported no current or historical hands-on activity during the CVSA procedures. Of these 43 travelers and six child pornography suspects who did not admit to hands-on sexual abuse, only 19 (38.8%) resulted in the "NSI" category (n = 13 travelers, n = 6 child pornography). The remaining 61.2% (n = 30, all travelers) concluded their exams with a "SI" determination, followed by admissions to hands-off sex offenses. We emphasize the finding that for all n = 62 suspects (traveler and child pornography) with "SI" results, investigators obtained verifiable admissions (to at least one sex crime ± victim). In other words, in this study, the CVSA produced 0% Type I errors (i.e., no false positives).

For all "SI" exams that resulted in victim disclosures, the investigator executed an average of three successful voice stress analysis charts in a row (Bernoulli C^3_3, p = .125). One individual in particular (a child pornography suspect), made 23 victim disclosures at consecutive points during the CVSA process. He disclosed 8.7% (n = 2) of his victims during the pretest process, followed by disclosure of 91.3% (n = 21) of his victims during the post-exam process. The latter was a result of n = 4 separate/consecutive voice stress analysis charts that indicated "SI" results followed by verified admissions until the suspect requested to stop and consult with an attorney (Bernoulli C^4_4, p = .0625). Two other cases (n = 1 traveler, n = 1 child pornography) also resulted in four successful CVSA charts

in a row, while four travelers' cases resulted in five successful CVSA charts in a row (Bernoulli C^5_5, $p = .0321$), all of which demonstrate success probabilities at rates significantly superior to chance. To further support this notion, when applying the Chi-square goodness of fit test on this study's rates, we found that the SI and NSI rates did not distribute according to chance [χ^2 (3) = 23.529, p (2-tailed) < 0.001].

Disclosure rates: Sex crimes and hands-on offenses

Of the 82 suspects with no known history of sex crimes, 80.5% (n = 66) admitted to at least one sex crime offense during the investigation (i.e., child pornography, sending nude images to a minor, sex with minor(s)) and 40.2% (n = 33) admitted to committing a combination of sex crime offenses. Also, n = 33 admitted to sexually abusing at least one child; this constituted 40.2% of the total sample population.

Before their participation in a CVSA examination (i.e., during the initial interview phase), none (0%) of the suspects provided an initial admission to previously undetected child sex crimes. However, during the CVSA examination process, 80.5% (n = 66) of the pooled n = 82 study sample provided initial disclosures regarding any sex crime: n = 11 during the pretest interview, and n = 55 during the posttest interview. With respect to victimization, of the n = 33 total initial disclosures relevant to hands-on abuse: 6.1% (n = 2) were provided during the pre-CVSA interview, and 93.94% (n = 31) occurred during the post-CVSA interview.

Although this study's total hands-on disclosure rate is 40.2%, this rate represents the pooling of data from two sex offender populations: travelers and child pornography. Parsing the results further, the hands-on disclosure rate of travelers is 36.7% (n = 25), whereas the hands-on disclosure rate of child pornographers is 57% (n = 8), which is within the range of what the literature reports (Bourke et al., 2014). Additionally, a chi-square test for differences in overall hands-on disclosure probabilities between the two populations was performed and showed no significant difference, (χ^2 (2) = 2.0048, $p = .156802$).

Previously, researchers have reported that the closer to the point of arrest individuals undergo truth verification testing, the higher the rate of initial disclosure (Bourke et al., 2014). Variations existed between travelers and child pornography regarding the moment when suspects first disclosed victimizations. In this study, wherein all suspects underwent CVSA examinations within 20–45 minutes following their arrest (20–25 minutes on average for travelers, 45 minutes on average for child pornography), initial disclosures for hands-on victims occurred during the posttest procedure for travelers and child pornography suspects at rates of 96% and 87.5%, respectively. These figures stand in stark contrast to the 0% victimization disclosure

rates for travelers and child pornography cases (n = 121) investigated by the same organization before the use of the CVSA.

Study data revealed disclosures were obtained at two of the four procedural steps in the CVSA examination process (i.e., during the pre and post-exam interviews). Of the 66 individuals (pooled travelers and child pornography offenders) who acknowledged previously undetected sexual criminality, 50% (n = 33) disclosed only hands-off crimes, 4.5% (n = 3) disclosed both hands-off and hands-on crimes (in that order, pre to post-exam, respectively) and 45.5% (n = 30) disclosed hands-on crimes solely. Of the n = 33 total hands-on crime disclosures (a total of n = 87 victims), both current and historical victims were identified during the pre and post-exam procedural steps: 6.1% (n = 2) were provided during the pre-CVSA interview, and 93.94% (n = 31) occurred during the post-CVSA interview.

During the pretest phase, one traveler admitted he had abused one victim (M = 1), and one child pornography offender yielded an additional two victims (M = 2). Cases requiring posttest interviews resulted in disclosures by 31 suspects to an additional 84 victims (pooled, M = 2.7, SD = 3.85; traveler M = 1.92, SD = 0.81; child pornography M = 4.88; SD = 7.61). The total number of hands-on victims disclosed by this study's 2-tiered population was 87 (48 hands-on traveler victims; 39 child pornography hands-on victims). Examinations subsequently led to the specific identification (i.e., by name) of 87 victims (100% of the total disclosed), some of whom were still minors at the time of the CVSA. A total of n = 87 victims were identified by name, and 83.9% were located. Among the 82 offenders who consented to a CVSA, 0% admitted they were actively victimizing a child.

Correlating time to confession

In the pooled group of traveler and child pornography suspects who tested "SI" after taking a voice stress analysis examination, we found the following significant associations: (1) a weak, direct relationship between employment status and time to first admission ($\rho = 0.322$, $p = .015$), (2) a moderate, direct relationship between number of victims and time to first admission ($\rho = 0.594$, $p \ll 0.01$), and (3) a strong, direct relationship between penalty point values and time to first admission ($\rho = 0.649$, $p \ll 0.01$). According to our parametric and non-parametric analyses, youngest victim age, age of suspects, education level, race, and socioeconomic status had no influence on time to confession.

Profiling travelers vs. child pornographers

Upon reviewing the n = 14 child pornography and n = 68 traveler cases, various elements of demographical data were similar, while others were divergent.

Concerning race and ethnicity, Caucasians were the race most represented (at 85.7% and 72.1%) for both child pornography and travelers, respectively. The next most represented race/ethnicity for both child pornography and travelers were Hispanics (with nearly equal representation at 14.3% and 13.2%, respectively). In the child pornography group, there was no representation of African-Americans, Asians, and Middle-Easterners. In contrast, travelers consisted of 7.4% African-Americans, 5.9% Asians, and 1.5% Middle Easterners. Regarding economic status, the middle class was the status most represented among both child pornography and travelers. For child pornography suspects, the highest to lowest represented economic status was: middle class (64.3%), blue-collar (21.4%), wealthy (at 14.3%), and poor (0%). For traveler suspects, the highest to lowest represented economic status was: middle class (82.4%), wealthy (8.8%), poor (7.4%), and blue-collar (1.5%). Relevant to employment status, full-time (inclusive of business owners) employees were the highest represented group in both child pornography and traveler suspects (at 78.6% and 78%, respectively). The next highest represented group for child pornography was retirees (14.3%), followed by those who were unemployed, 7.1%. For child pornography, there was 0% "part-time employment," "disabled," or "high school student" representation. This trend was not present with the travelers, who (after Full-time employment representation) were followed in nearly equal frequencies by part-time (4.4%), unemployed (5.9%), disabled (5.9%), and student suspects (4.4%), with retirees representing the least (1.5%). Germane to education level, for both child pornography and traveler suspects, a High School diploma was the most frequently represented, at 64.3% and 76.5%, respectively, followed by college graduation at 28.6% and 16.2%, respectively. For child pornography suspects, the next most common education level achieved was post-college graduate studies (7.1%), with no high school dropouts represented. For two of the child pornography suspects who were high school graduates, certifications were also represented (e.g. photography, run armory). By contrast, traveler suspects were represented by some college graduates (4.4%) and high school dropouts (2.9%), but no post-college graduate studies or additional certifications. Regarding criminal records histories, there were no prior sex-crimes arrests for 100% of both child pornography and travelers. 98.8% (n = 81) were not previously implicated in sex crimes. Most of the suspects in each sex-crime type suspect group had no criminal records, at 78.6% and 97.0%, for child pornography and travelers, respectively. In the child pornography group, 14.3% of the suspects had prior arrests for Domestic Battery, and 7.1% had priors for Burglary. For travelers, the prior criminal rate history was even lower, at 1.5% for Domestic Battery and 1.5% for Burglary/Domestic Battery. With respect to age, n = 14 child pornography suspects were significantly older than the n = 68 travelers (45.07 ± 4.62 YOA vs. 33.9 YOA ± 1.53 YOA, $p = .04$). In the travelers' group, non-victimizers were approximately the same as victimizers (33.1 ± 1.9 YOA vs. 35.1 ± 2.5 YOA, $p = .557$). However, in the child pornography group, victimizers

were almost half as young as their non-victimizing counterparts (33.8 ± 3.5 YOA vs. 60.2 ± 5.3 YOA, $p = .002$).

Profiling non-victimizer and victimizers

Non-victimizers (child pornography vs. travelers)

We executed Student's t-test (2-tailed, unmatched, unequal variance) and SBSS Fisher's exact test (± Freeman-Halton extension) analyses between the data for non-victimizers of child pornography vs. travelers. Regarding the non-victimizing suspects in both groups, n = 6 child pornographers were found to be significantly older than n = 43 travelers (60.2 ± 5.26 YOA vs. 33.3 ± 1.93 YOA, $p = .0025$). A significant economic disparity was also found between non-victimizers of both groups ($p = .044$), with travelers representing 28.6% fewer wealthy, 31.4% more middle class, 12.4% fewer blue-collar, and 11.6% more poor (vs. 0%) offenders than their child pornography counterparts. A significant degree of educational disparity was found between non-victimizers of both groups ($p = .002$), with travelers showcasing 36% fewer college graduates, 24% more high school graduates, and 4.7% (vs. 0%) more high school dropouts than child pornography suspects. Otherwise, the race/ethnicity, employment status, and prior arrests/criminal records distributions were similar between non-victimizers of child pornography vs. travelers (Table 1).

Victimizers (child pornography vs. travelers)

Upon seeking evidence of an association between the sending of nude images and hands-on offenses with minors, significant relationships were found in the travelers' group [χ^2 (1) with Yates correction = 10.264, p (2-tailed) = 0.0014]. We discerned no significant associations for either travelers or child pornography between the possession/use of child pornography and the incidence of sex with minors (i.e., could have to do with low "n"). Additionally, we conducted Student's t-test analyses (2-tailed, unmatched, unequal variance) and SBSS Fisher's exact test (± Freeman-Halton extension) between the data for victimizers of child pornography vs. travelers. Regarding the victimizing suspects of both groups, the ages were not significantly different (33.8 ± 3.45 YOA for n = 8 child pornography vs. 35.12 ± 2.47 YOA for n = 25 travelers, $p = .751$). Concerning the age of the youngest victim, significant differences were found between the two groups (8.63 ± 1.21 YOA in child pornography, vs. 13.08 ± 0.40 YOA in travelers, $p = .0073$). This finding was confirmed via multiple regression analysis (see next section). Additionally, we discovered significant differences regarding whether suspects knew their victims (75% of child pornography were familiar with their victims, vs. 8% of travelers, $p = .001$). Relative to the economic status of victimizers in each group, we also found significant differences ($p = .042$), with traveler victimizers consisting of 16% wealthy (vs. 0% child

Table 1. Comparison of non-victimizing child pornographers and travelers.

Non-Victimizers (n = 49)	Child Pornographers (n = 6)	Travelers (n = 43)	p-value (2-tailed)
Non-victimizer Age (YOA)	60.2 (± 5.26 SEM)	33.3 (± 1.934 SEM)	.0025*
Race/Ethnicity			
Caucasian	100% (n = 6)	74.4% (n = 32)	
African-American	0% (n = 0)	9.3% (n = 4)	
Hispanic	0% (n = 0)	11.6% (n = 5)	
Asian	0% (n = 0)	4.7% (n = 2)	
Arab/Middle Eastern	0% (n = 0)	0% (n = 0)	1**
Economic Status			
Wealthy	33.3% (n = 2)	4.7% (n = 2)	
Middle	50% (n = 3)	81.4% (n = 35)	
Blue-Collar	16.7% (n = 1)	2.3% (n = 1)	
Poor	0% (n = 0)	11.6% (n = 5)	.044**
Employment Status			
Full-time	66.7% (n = 4)	74.4% (n = 32)	
Part-time	0% (n = 0)	2.3% (n = 1)	
Disabled	0% (n = 0)	9.3% (n = 4)	
Retired	33.3% (n = 2)	2.3% (n = 1)	
Unemployed	0% (n = 0)	7% (n = 3)	
Student	0% (n = 0)	4.7% (n = 2)	.226**
Education Level			
Post-Graduate	0% (n = 0)	0% (n = 0)	
College Grad	50% (n = 3)	14% (n = 6)	
Some college	0% (n = 0)	7% (n = 3)	
High School	16.7% (n = 1)	74.4% (n = 32)	
High School & certificates	33.3% (n = 2)	0% (n = 0)	
GED	0% (n = 0)	0% (n = 0)	
Dropout	0% (n = 0)	4.7% (n = 2)	.002**
Prior Arrests/Criminal Records			
Burglary & Domestic Battery	0% (n = 0)	2.3% (n = 1)	
Burglary	0% (n = 0)	0% (n = 0)	
Domestic Battery	0% (n = 0)	2.3% (n = 1)	
Sex Crimes	0% (n = 0)	0% (n = 0)	
None	100% (n = 6)	95.3% (n = 41)	1**

*Student's t-test (2-tailed, unmatched, unequal variance)
**Fisher's exact test (SBSS) ± Freeman-Halton ext.

pornography), 9% more middle class than child pornography victimizers, and 0% blue-collar and poor (vs. 25% of blue-collar child pornography victimizers). Finally, respecting criminal-history, we found a significant disparity between victimizers of both groups (p = .01), with 100% of traveler victimizers never before having been arrested, vs. the 12.5% Burglary and 25% Domestic Battery charges of the child pornography victimizers. Otherwise, the number of victims per victimizer (1.92–4.88), time to 1st admission (58.56–73.75 minutes), victim gender preference (62.5–88% males, 12–25% females, 0–12% both genders), race/ethnicity, employment status, and education level distributions were not significantly different between victimizers in the child pornography vs. traveler groups. Despite the lack of significance found, we should nevertheless note that gender crossover was observed solely with child pornographers (12.5%), versus the 0% gender crossover preference with travelers (Table 2).

Table 2. Comparison of victimizing child pornographers and travelers.

Victimizers (n = 33)	Child Pornographers (n = 8)	Travelers (n = 25)	p-value (2-tailed)
Victimizer Age (YOA)	33.8 (± 3.45 SEM)	35.1 (± 2.47 SEM)	.751*
Age of Youngest Victim (YOA)	8.63 (± 1.21 SEM)	13.08 (± 0.40 SEM)	.0073*
# Victims/Perp	4.88 (± 2.69 SEM)	1.92 (± 0.16 SEM)	.3087*
Time to 1st Admission (mins)	58.56 (± 15.47 SEM)	73.75 (± 13.10 SEM)	.4635*
Familiarity			
Knew Victims	75% (n = 6)	8% (n = 2)	
Didn't know Victims	25% (n = 2)	92% (n = 23)	.001**
Gender Preference			
Males	62.5% (n = 5)	88% (n = 22)	
Females	25% (n = 2)	12% (n = 3)	
Males & Females	12.5% (n = 1)	0% (n = 0)	.137**
Race/Ethnicity			
Caucasian	75% (n = 6)	68% (n = 17)	
African-American	0% (n = 0)	4% (n = 1)	
Hispanic	25% (n = 2)	16% (n = 4)	
Asian	0% (n = 0)	8% (n = 2)	
Arab/Middle Eastern	0% (n = 0)	4% (n = 1)	1**
Economic Status			
Wealthy	0% (n = 0)	16% (n = 4)	
Middle	75% (n = 6)	84% (n = 21)	
Blue-Collar	25% (n = 2)	0% (n = 0)	
Poor	0% (n = 0)	0% (n = 0)	.042**
Employment Status			
Full-time	87.5% (n = 7)	84% (n = 21)	
Part-time	0% (n = 0)	8% (n = 2)	
Disabled	0% (n = 0)	0% (n = 0)	
Retired	0% (n = 0)	0% (n = 0)	
Unemployed	12.5% (n = 1)	4% (n = 1)	
Student	0% (n = 0)	4% (n = 1)	.776**
Education Level			
Post-Graduate	12.5% (n = 1)	0% (n = 0)	
College Grad	12.5% (n = 1)	20% (n = 5)	
Some college	0% (n = 0)	0% (n = 0)	
High School	62.5% (n = 5)	80% (n = 20)	
High School & certificates	0% (n = 0)	0% (n = 0)	
GED	12.5% (n = 1)	0% (n = 0)	
Dropout	0% (n = 0)	0% (n = 0)	.109**
Prior Arrests/Criminal Records			
Burglary & Domestic Battery	0% (n = 0)	0% (n = 0)	
Burglary	12.5% (n = 1)	0% (n = 0)	
Domestic Battery	25% (n = 2)	0% (n = 0)	
Sex Crimes	0% (n = 0)	0% (n = 0)	
None	62.5% (n = 5)	100% (n = 25)	.01**

*Student's t-test (2-tailed, unmatched, unequal variance)
**Fisher's exact test (SBSS) ± Freeman-Halton ext.

Victim detail predictors

A SBSS multiple regression was run to predict "youngest victim age" from the following variables: time to first admission, victimizer age, victimizer type (child pornography, traveler), number of victims (admitted to), race/ethnicity, employment status, education level, economic status, and number of prior arrests. After we eliminated three outlier cases from the analysis, there

was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. Residuals were independent, as assessed by a Durbin-Watson statistic of 2.100. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater than ±3 standard deviations, and no values for Cook's distance above 1. The assumption of normality was met, as assessed by a Q-Q Plot. The multiple regression model significantly predicted victim number, $F(9,17) = 8.051$, $p < .001$, adj. $R2 = .71$. The three variables that significantly added to the statistical prediction, $p < .01$, were victimizer type, economic status. and the number of arrests. More specifically, child pornography offenses, lower socioeconomic status. and a greater number of arrests predicted a younger victim age.

Discussion

This retrospective study (1) examines the incidence of hands-on sexual abuse against minors by men who either downloaded, possessed, or distributed child pornography or were travelers (solicited minors online), (2) offers an initial assessment of the quickly incorporated CVSA technique, and (3) shows similarities and differences between the two offender populations represented. The data collected consists of demographics, historical record info, CVSA timings, and behaviors disclosed by offenders undergoing the CVSA examination; specifically, admissions of sexual crimes, including hands-on victimization of children that were never previously detected. In every case, the individuals (suspects) came to the attention of law enforcement due to their involvement in adjunctive behavior (e.g., possession of child pornography or solicitation of a minor). After each suspect was confronted (via arrest) and interviewed about his online offense(s), he had an opportunity to reveal other offenses committed. None of the suspects in this study disclosed information before the introduction of the CVSA. With each introduction, the investigating officer inquired "what else" each suspect had done relative to sexual interest in children. In none of the cases of this study were disclosures provided prior to the introduction of the CVSA, when the investigating officer merely asked them "what else" they had done related to their sexual interest in children. In all cases, the pivotal moment from censored silence to first disclosure did not occur until the introduction of the CVSA, when the men were ready to discuss their online-linked offenses (either pre or post CVSA interview). All suspects agreed to undergo a CVSA examination. If the CVSA results were "SI," the suspects were confronted with the knowledge that their voices had "betrayed" them, at which point all

of them began to disclose details about the offenses they had previously and intentionally kept secret.

Investigative power of the CVSA

Recently, very compelling research has shown that using a traditional "lie detection" device, the polygraph, as a tool for extracting information from child sex offenders is very useful (Bourke et al., 2014; DeLisi et al., 2016; Krueger, 2009). At the time of this writing, the procedure of quickly implementing CVSA might serve to complement the latter, in that it, too, is gaining ground as a powerful investigative tool (Chapman & Stathis, 2012; McCarty, 2013). Its power rests only partially in its ability verify truthfulness, because, most street-savvy law enforcement personnel (e.g., police and detectives) are trained to determine when people are dishonest, misrepresenting case details, concealing or being unforthcoming with critical details and relevant information. Therefore, the main advantage of using the CVSA is not determining whether a person is deceptive, but rather what exactly they are hiding.

There are limitations to the current study that should be addressed by future research endeavors. We did not examine specific CVSA procedures, and an investigation of such methodology may reveal factors that could further enhance the effectiveness of using this investigative tool. The field would benefit from an empirical investigation into how soon after arrest to offer the CVSA and which environment is ideal for conducting the examination. Also, it may be interesting to examine the correlation between specific criminal behaviors (e.g., the quantity or type of child abuse or nude images collected or distributed) and disclosure of hands-on crimes. Another limitation of this study was the less than an optimal number of cases represented in the child pornography group.

Also, only men were represented. Future, randomized studies that compared male and female offenders could offer great insight into the trends and profiles of child pornography vs. traveler offenders of both sexes. A future meta-analytical study that compared data between multiple law enforcement entities in various regions of the country that use CVSA for these two offending populations would be beneficial, as it would provide external validity. Additional ideas for subsequent studies are: gaining information about trafficking ring involvement, whether or not victimizers were also victimized (in their youth) thereby propagating patterns, patterns among victims (e.g., first time victimized, online behaviors, relationship with parents), discriminating between "Virtual (Situational or Opportunistic)", "Classic (Chronic)" and other offending subtypes (e.g., Walking Prowlers) among travelers in order to further correlate methods of manipulation with crimes of escalation and understand the inherent psychological trends and

issues involved (Hewitt, Beauregard, & Davies, 2016; Marcum, 2007; Young, 2004).

The following are the critical strengths inherent to this study: (1) This study is an essential contribution of a very detailed and unique data set by an organization with proficient experience identifying sexual offenders, both before and after training in the CVSA. Since this study's data originated from one organization, fewer potentially confounding variables were introduced (e.g., differences in training and approach styles, interviewing methods, CVSA procedures, and timings post warrant), (2) Due to the level of detail provided for the two different offender types (child pornography vs. travelers), multiple analyses were able to be successfully conducted, (3) Due to the nature of the CVSA in providing no "Inconclusive" results, the investigative process took less time to complete, (4) Portions of this analysis specific to child pornography offenders were corroborated by a prior published study that used a different investigative tool, namely the polygraph (Bourke et al., 2014), (5) Comparisons and contrasts made between child pornography and traveler offenders, as well as Victimizer vs. Non-Victimizers, illuminated profile trends and foci, and (6) A predictive relationship between specific victimizer qualities and victim outcomes (i.e., the youngest age) was determined.

Profiles of travelers vs. child pornographers, and non-victimizers vs. victimizers

Interestingly, although most child pornography and traveler offenders in this study are Caucasian, travelers were more ethnically diverse than child pornography offenders, who consisted of either Caucasian or Hispanic individuals. This study demonstrates that most of its online sexual offenders are middle class, employed full-time, are high school graduates, and have never had criminal records (with 100% of the individuals having never been arrested for a sex-crime).

It is particularly important to note the differences between the victimizers of both offending groups, as this information could complement other documented profiling characteristics, thereby providing investigators with additional trend clues to enable the solving of cases quicker. Perhaps, the younger victim age preference of child pornography offenders is in alignment with their ability to more readily groom their more familiar victims. Due to Traveling offenders actively seeking mostly unfamiliar victims by trolling online, the teenage stage preference of victims might be in alignment with the average age wherein victims use the world wide web regularly without parental supervision. It is possible the increased wealth status of travelers (over their child pornography counterparts) provides them with the

additional resources needed (e.g., computer equipment, software and cars) to lure their victims, and to cover their tracks.

As illuminated by this study, the fact that "sending of nude images" trumps the "possession/use of child pornography" in predicting who the victimizers are should be a wake-up call to the general investigative community, for whom travelers have been previously successful at eluding detection (as revealed by their 0% criminal histories).

We underscore the finding that each child pornography offender victimized an average of five minors – other researchers have discerned similar multi-victim offense rates (Bourke & Hernandez, 2009; DeLisi et al., 2016) – whereas traveler offenders victimized an average of two. In other words, especially for child pornographers, these predators were serial offenders, who left many victims in their wake. Therefore, investigators should not expect 1:1 offender to victim ratios. If there is one (victim), probability predicts there will be more. Additionally, there was a higher likelihood of gender "crossover" with child pornographers – social scientists have previously cited this trend (Bourke & Hernandez, 2009), whereas there was no crossover with the travelers in this study, who appear to prefer either male or female only victims.

Relevant to both child pornographers and travelers, the more crimes committed, and the more children victimized, the longer it took for them to confess. This is crucial for investigators to note this finding since it is equivalent to saying that if a deceptive suspect is not confessing within a certain time-period, investigators should not give up – being patient and applying advanced interviewing tactics to gain admissions could be worthwhile in providing essential criminal information and critical victim disclosures.

Finally, in this study, for online child sex predators who victimized, child pornography offenses, lower socioeconomic status, and a higher number of arrests predicted a younger victim age. These relationships may serve as foci or jumping-off points for future investigators.

Conclusion

This retrospective study has the potential to enable a deeper understanding of the way child sexual offenders are approached and handled, especially as concerns the acquisition of critical, concealed information. Akin to the highly effective polygraph procedure compellingly described elsewhere (Bourke et al., 2014), the advantages CVSA brings to the investigative table are multifarious.

First, the findings here strongly corroborate the literature that researchers should not consider child sex offenders as "hands-off" based on the absence of criminal histories (DeLisi et al., 2016). Furthermore, system officials who interact with these offenders (e.g., therapists, detectives, probation officers, and attorneys) should cease labeling these men as "hands-off" offenders, as

a result of self-reporting. Not only do criminals tend toward mendacity, but sex offenders are particularly inclined to lie regarding their undetected deeds. The current study supports the literature in revealing that both child pornography and traveler offenders are sexually drawn to children and that more often than not, these individuals have victimized at least one child via an act of hands-on sexual abuse.

Second, this study suggests that the standard law enforcement interview process alone may not be enough to obtain truthful disclosures. However, combined with an effective tool such as the CVSA, the results obtained by a professional and thorough interview can be significantly multiplied. One of CVSA's strengths is its enablement of the obliging connection between examiner and examinee throughout the disclosure process. The CVSA technique allows the instrument to "point the finger" at the offender for being deceptive, rather than the interviewer, who can align with the presentation of being an unbiased third-party – an intermediary between the accused and the technology – whose only objective is to determine the truth in a cooperative, calm, and patient manner, which is useful when interviewing child sex offenders. In the current study, wherein 100% of "SI" examinations resulted in disclosures, 89% of initial or additional disclosures occurred during the posttest interview. Also, consider this: one child pornography suspect in this study was interrogated five years earlier about the sexual abuse of his sisters. At that time, due to the non-implementation of additional technological tools (e.g., CVSA, polygraph), as a result of lack of evidence and confession, the case was closed. During the more recent ICAC investigation, the same suspect was arrested, and after taking a CVSA exam, confessed to having molested all three of his sisters 20 years prior (i.e., three live victims). As a whole, these compelling results further support the argument that the CVSA instrument, when placed in the hands of a seasoned, well-trained examiner, can lead to the discovery of undetected sex offenses and victims.

Third, CVSA obtains authentic, quantifiable data. In this sample, previously unknown criminal activity involving the sexual assault of children was found among 8 of 14 (57.1%) offenders who were initially under investigation for possessing child pornography material, and 25 of 68 (36.8%) offenders who were initially under investigation for soliciting minors online.

Fourth, the timing of CVSA implementation in the interrogation process is of consequence. Researchers in the field previously established that offenders are more likely to attrite from the truth verification process the later it is offered after the point of warrant execution (Bourke et al., 2014). Thanks to its versatility and its high degree of portability, from an arrest vehicle's front seat to a suspect's home, the CVSA can successfully be used almost anywhere. The combined versatility and portability of CVSA enables investigators to use it quicker, post-arrest, which is critical. Perhaps since all CVSA examinations presented in this study were executed within 20–45 minutes post-arrest, once they agreed to take the CVSA, 100% of suspects completed their respective exams.

Fifth and perhaps most importantly, as a result of CVSA, investigators discovered victims who were previously undetected. After completing 82 CVSAs, suspects disclosed the identities of 87 child victims, inclusive of grim details of the sexual crimes committed. In most cases, legal authorities were able to initiate an immediate response by providing social assistance to these reticent survivors. When readers consider the finding that two in five of the offenders in the current study acknowledged abusing at least one victim, the need to obtain victim identifying information in as expeditious a manner as possible becomes paramount.

We are confident there is much to be gained by the use of CVSA examinations during child sex offender investigations, and that a certified CVSA examiner should preferentially be accessible whenever confronting suspects about their illegal sexual activity. The results of this study demonstrate that CVSA is not only critical in validating predatory behavior, but also in identifying victims. Focusing on the latter might serve to attenuate the domino-contagion effects of criminality, suffering, and shame. It is common for victims of sexual assault to delay their own disclosures of exploitation by years or decades due to a myriad of reasons (i.e., denial, not wanting to relive the trauma, believing the myth that their behaviors provoked their attackers, and fear of how others will react) (State of California Department of Justice, 2010). Therefore, the expectation that victims will reveal themselves is neither justifiable nor realistic. Only after investigators identify crucial details relevant to online sex offense cases can effective remediation come to fruition. By using the various modern, investigative tools available that have independently proven to be efficacious in eliciting disclosures, investigators can save time in evidence discovery, offender punishment or rehabilitation, and locating the very victims who deserve to be protected and healed.

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Disclosure of interest

Authors declare that they have no conflicts of interest to report.

Ethical standards and informed consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation [institutional and national] and with the Helsinki Declaration of 1975, as revised in 2000. Not originally collected for research purposes, the secondary data was de-identified prior to being released to and analyzed by the authors.

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