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A Validation Study of the Child Pornography Offender Risk Tool (CPORT)

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Abstract

The Child Pornography Offender Risk Tool (CPORT) is a seven-item structured tool to assess the likelihood of future sexual offending over a 5-year fixed follow-up. The current study examined 5-year fixed follow-up data (15% any new sexual offense, 9% any new child pornography offense) for a validation sample of 80 men convicted of child pornography offense(s). Although statistical power was low, results were comparable with the development sample: The CPORT had slightly lower predictive accuracy for sexual recidivism for the overall group (area under the curve [AUC] = .70 vs. .74), but these values were not significantly different. Combining the development and validation samples, the CPORT predicted any sexual recidivism (AUC = .72) and child pornography recidivism specifically (AUC = .74), with similar accuracies. CPORT was also significantly predictive of these outcomes for the child pornography offenders with no known contact offenses. Strengths and weaknesses of incorporating CPORT into applied risk assessments are discussed.

Keywords

risk assessment, child pornography, child sexual exploitation material, validation study, CPORT

There has been a steady increase in the identification of individuals involved with child sexual exploitation material, legally referred to as child pornography in Canada (see Seto, 2013). An important question for decision-makers is the risk a

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child pornography offender poses to sexually reoffend, in order in order to guide the prioritization of police investigations, sentencing, treatment, and supervision. There is limited research on how to best assess the sexual recidivism risk of child pornography offenders. For individuals who also have other types of sexual offenses, well-established tools such as the Static-99R (www.static99.org) may be applicable, depending on the inclusion criteria of those tools. An early study suggested that a modified Risk Matrix 2000 could predict sexual recidivism in a large sample of online offenders in the United Kingdom, whether or not they had a contact sexual offense history (Wakeling, Howard, & Barnett, 2011). However, most of the predictive effect was driven by a small group of 26 mixed (child pornography and contact sexual offenses) offenders assigned to the "very high" risk category.

More recently, the Child Pornography Offender Risk Tool (CPORT) was published as a child-pornography-offender-specific tool (Seto & Eke, 2015), based on the correlates of recidivism in this population (Eke, Seto, & Williams, 2011; Seto & Eke, 2005; Seto, Hanson, & Babchishin, 2011). An original goal in the development of this tool was to assist in the prioritization of cases for police and other criminal justice professionals as well as gathering information relevant to offending that could be important for case management, supervision, and prioritizing treatment goals. The variables assessed in the development study were those available during a police investigation and, therefore, have certain limitations (e.g., a lack of items from clinical assessments). The CPORT is comprised of seven items relating to offender age, criminal history, sexual interest in children, and child-related content, simply scored as present or absent: (1) age at the time of the index investigation, 35 or younger; (2) any prior criminal history; (3) any failure on conditional release; (4) any contact sexual offending; (5) indication (admission or diagnosis) of sexual interest in prepubescent or pubescent children; (6) more boy than girl content in child pornography; and (7) more boy than girl content in other child-related materials. In the initial development sample of 266 men (see Figure 1) convicted of child pornography offenses and followed for a fixed period of 5 years, the CPORT significantly predicted any sexual recidivism, area under the curve (AUC) = .74, 95% confidence interval (CI) [.63, .84] with AUC = .76, 95% CI [.65, .88] for child pornography recidivism specifically. Seto and Eke (2015) further subgrouped the sample based on other criminal offending: The CPORT did not significantly predict any sexual recidivism for those with no other criminal offending (AUC = .63, 95% CI [.41, .86]) compared with those with any contact sexual offending (any sexual recidivism AUC = .80, 95% CI [.63, .96]) or those with other offending but not contact sexual offending (any sexual recidivism AUC = .69, 95% CI [.54, .83]).

We are aware of only one attempt to validate the CPORT. In Pilon's (2016) thesis, the CPORT was modified as follows: age based on remand or sentence start date (rather than age at time of investigation), prior history based on convictions (not charges), indication of sexual interest in children based on luring or sexual interference involving youth, and omitting the two child content items. This modified CPORT significantly predicted any new criminal convictions in a 3-year follow-up of 279 child pornography offenders, with a higher (albeit nonsignificantly so) predictive

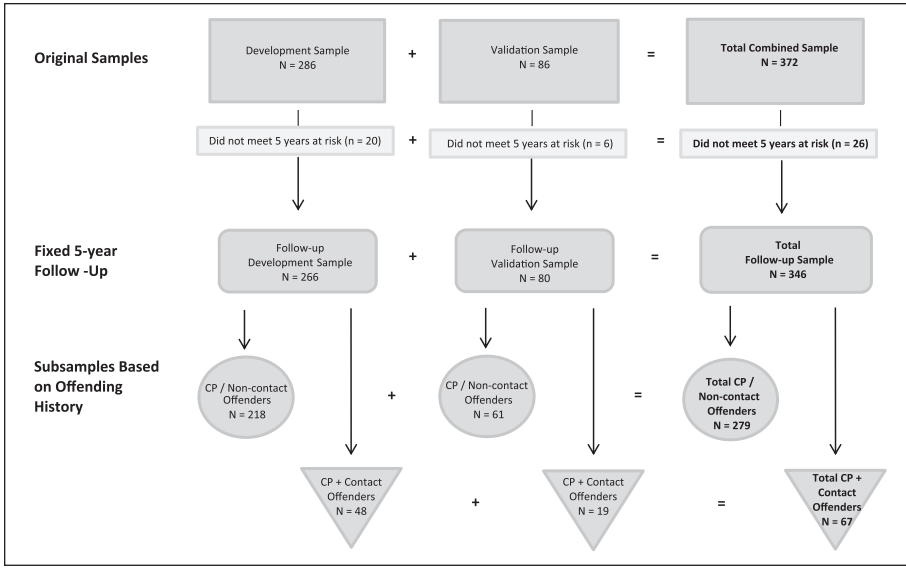

Figure 1. Flowchart detailing the development, validation, and combined samples.

accuracy (.68 vs. .63) than a standard general offender tool, the Level of Service Inventory–Ontario Revised (LSI-OR; Andrews, Bonta, & Wormith, 1995). The modified CPORT did not significantly predict sexual recidivism (AUC = .56, 95% CI [.32, .79]), possibly as a result of the low base rate of any sexual recidivism (2.9%) in the follow-up, differences in coding sexual interest in children, and the missing child content items, which would be particularly relevant in predicting sexual as opposed to nonsexual offenses. Pilon's sample may have overlapped with the CPORT development sample, because data came from the same geographic region during an overlapping time period, but this could not be determined.

CPORT Item 5 (admission/diagnosis of sexual interest in children) was the most commonly missing item in the development sample and is also vulnerable to falsifying due to its reliance on self-reported sexual preferences (see Eke & Seto, 2016). This led to the development of the CASIC (Correlates of Admission of Sexual Interest in Children), a six-item measure that correlates with CPORT Item 5 and could be used as a possible substitute for the item when it is missing (Seto & Eke, 2017). We examined the utility of the CASIC in this study.

The Present Study

The purpose of the present study was to validate the predictive accuracy of the CPORT in an independent, but geographically similar sample of men convicted of child pornography offenses. We had access to similar information as in the development sample, with some exceptions (see "Procedure"); these exceptions perhaps better reflect

the type of information other CPORT users may have access to via court documents and police reports. We hypothesized that the CPORT would significantly predict any sexual recidivism and specifically child pornography recidivism in this new sample. We also examined whether the CASIC could substitute for CPORT Item 5; we predicted that using the CASIC would not decrease predictive performance.

Given the small validation sample size (n = 86, n = 80 with 5-year recidivism information),[1] we compared the CPORT results to the development sample; the similarities supported combining both samples to provide greater statistical power for subgroup analyses (see Figure 1). With the combined 5-year fixed follow-up data set (77% contributed by the development sample and 23% contributed by the validation sample), we explored analyses that were not conducted in the original development sample of the scale, including examining child pornography recidivism specifically as an outcome. Normative data for the CPORT were updated by combining both samples. In addition, given recent research comparing recidivism among child pornography offenders with and without contact sex offenses (e.g., see Eke et al., 2011) and work suggesting important risk-relevant differences (Babchishin, Hanson, & VanZuylen, 2015), we assessed these groups separately.

Method

Sample

The initial sample consisted of 86 child pornography cases provided by a large provincial police service. Few cases (7%) came from a rural location (i.e., population less than 1,000 people), a quarter (24%) came from urban locations (population greater than 100,000), and the rest came from urban–rural locations (location not available from the development study). Cases came to the attention of police in numerous ways. Similar to the CPORT development sample, over half of the individuals (59% in the validation sample, 51% in the development sample) were detected because of their online activity (e.g., peer-to-peer sharing discovered by police) whereas the rest (41%) were detected or reported for offline reasons (e.g., wife discovered her husband had child pornography and called police). Similar to the development sample, most of the individuals (91%) used online technologies to commit (at least in part) their child pornography offenses (88% in development sample). The remainder purchased the material offline (e.g., a few purchased it during their travels to another country) or made it themselves. The validation sample significantly differed, however, in how they were detected by police online: In the development sample, police undercover or proactive investigations led to the detection of child pornography in 20% of cases, 49% here, $\chi^2(1) = 27.70$, $p < .001$, $n = 336$, and online purchases led to detection in 32% of cases, only 2% here; $\chi^2(1) = 29.97$, $p < .001$, $n = 336$.

All available cases that met the three selection criteria for the current study were coded: (a) closed investigations involving an adult (18 years of age or older) male[2] convicted of one or more child pornography offenses (i.e., possession, accessing,[3] distributing, or making/production), (b) the individual was not included in the

CPORT development study, and (c) the conviction was prior to 2011, to allow for a reasonable follow-up time. Most police investigations took place between 2006 and 2009, with conviction dates ranging between 2006 and 2010; two investigations began in late 2005.

Four (5%) of the 86 individuals in the sample died during the follow-up period. They remained in the sample with a minimum postindex follow-up time of 8 months and an average of 41 months (3.4 years; end of follow-up was defined as date of death). The majority of the sample (97%) had at least one index charge for possession of child pornography, almost half (45%) had distribution charges, and fewer had production charges (16%) or accessing (9%) charges. Most charges for production involved direct victimization of a child by the individual (e.g., taking images during contact sexual offenses, streaming live footage); in one case, the production charge related to transferring material from one electronic storage device to another. Just less than one third (31%) of the individuals had one index child pornography charge, and this was similar to the development sample (25%). The average number of child pornography charges at index was 2.42 (*SD* = 1.73, median = 2.00, range = 1-13). In 12 cases (14%), the individual was also charged with a contact sexual offense at the time of the index child pornography charge.

Unlike the development sample, none of the current individuals had prior child pornography charges, this is in part because we were accessing cases from a police service involved in the original development sample; if an individual had a prior child pornography offense investigated by this same police service, they would have been in the development sample. Although the inclusion criteria does bias the sample toward lower risk offenders (i.e., those without a prior child pornography offense), this is unlikely to make a substantial difference as only 6% of individuals in the CPORT development sample had a prior child pornography offense (Seto & Eke, 2015). Few offenders had prior contact sexual offense charges (*n* = 9, 10%); these offenders were detected for child pornography offending after committing a contact sexual offense, with seven known to have sexually assaulted a child and victim age unknown in the remaining two cases. A large minority of individuals had solely child pornography charges (39%), one third (35%) had current or prior charges for other offenses but not contact sex offenses, and the remainder (26%) had charges that included contact sex offenses; this was similar to the development sample (47%, 32%, and 21%, respectively).

Given the small validation sample size, results were first compared and then combined with the sample of 266 individuals from the CPORT development sample (Seto & Eke, 2015). The initial and final development samples and subsamples based on offense history are illustrated in Figure 1. In the combined sample of 346 men, individuals were classified into one of the two groups based on their offense history: The *child pornography noncontact* group (CP/NC; *n* = 279) included offenders who had not committed any known contact sexual offenses. For the vast majority of this group, their only sex offense was for child pornography, but a small number also had other noncontact sex offenses, including luring offenses (but with no in-person contact with the victim; *n* = 6) or exhibitionism[4] (*n* = 3). Some individuals in this group also had nonsexual offenses in their criminal record (e.g., theft, assault). The *dual* group (child

pornography plus contact [CP + C]; $n = 67$) had both child pornography and contact sexual offenses in their criminal record and may have also had other noncontact sexual offenses and nonsexual offenses as well.

Measures

CPORT. CPORT items were coded using the same rules as Seto and Eke (2015; see scoring guide by Eke & Seto, 2016, available at https://www.researchgate.net/project/Child-Pornography-Offender-Risk-Tool-CPORT). Frequencies for the seven CPORT items for the validation sample were as follows: (1) age at the time of the index investigation, 35 years or younger (38 cases, 44%; zero missing); (2) any prior criminal history (36 cases, 42%; zero missing); (3) any failure on conditional release (15 cases, 17%; zero missing); (4) any contact sexual offending (pre- or at index; 22 cases; 26%, zero missing); (5) indication (admission or diagnosis) of sexual interest in children (11 cases, 13%; 26 missing); (6) more boy than girl content in child pornography (15 cases, 17%; seven missing); and (7) more boy than girl content in other child-related materials (e.g., images of nude or partially clothed children; 15 cases, 17%; nine missing). The mean total CPORT score, out of a possible seven, regardless of missing items, was 1.77 ($SD = 1.50$, range = 0-7); scores based on the 58 cases with no missing information averaged 1.81 ($SD = 1.59$, range = 0-7). These are similar to the development sample ($n = 286$) where cases regardless of missing information were reported to average 1.99 ($SD = 1.58$, range = 0-7) and those with no missing averaged 2.01 ($SD = 1.60$, range = 0-7).

CASIC. The CASIC consists of six items correlating with indication of pedophilic or hebephilic sexual interests (see Seto & Eke, 2017): (1) never married (42 cases, 49% of sample; seven missing); (2) child pornography content included videos (58 cases, 67%; three missing); (3) child pornography content included sex stories involving children (8 cases, 9%; two missing); (4) evidence of interest in child pornography spanned 2 or more years (31 cases, 36%; 34 missing); (5) volunteered in a role with high access to children (11 cases, 13%; four missing); and (6) engaged in online sexual communication with a minor or officer posing as a minor (10 cases, 12%; two missing). In the validation sample, the average score on the CASIC was 1.90 ($SD = 1.16$, range = 0-6) for all cases ($n = 84$) and 2.37 in cases with no missing information ($SD = 1.20$, range = 0-6, $n = 49$); this was similar to the CASIC development sample where the average CASIC score was reported to be 2.21 ($SD = 1.22$, range = 0-6) for all cases and 2.37 ($SD = 1.22$, range = 0-6) for cases with no missing information ($n = 230$). Based on the analyses of Seto and Eke (2017), CASIC scores of 3 and higher can be used to substitute for missing information on Item 5 of the CPORT (this substitution was only used where specified).

Procedure

Information was coded from police files that included criminal history records, police occurrence reports, interview notes or transcription, police officer notes, forensic computer analysis reports, and details about the size and content of the pornographic and

child material. Unlike the development sample, we did not review videotaped police interviews; in the validation, we had access to transcripts from interviews in only one quarter of the cases (23%). In addition, we did not access (and categorize) child pornography ourselves; rather we scored the two CPORT content items using the forensic categorization notes and police report. We did this in part because the CPORT variables do not require precise estimates of numbers of child images, text, and movies, and because this is likely to be more realistic for CPORT users who may have estimates but not precise counts of child content.

Coding took approximately a half to a full day per case. The study domains were (a) offender demographics (age at index, marital status, education, occupation), (b) index charges and convictions, (c) criminal history (number and type of prior charges and convictions), (d) CPORT items, (e) CASIC items, (f) collection details (e.g., type and format of material), and (g) child pornography collecting behavior (e.g., length of time collecting). Permission to access case file information was obtained from the participating police service. This research was approved by the institutional review board of the Royal Ottawa Health Care Group.

Offense Categories

We collected data relating to charges and convictions using two main sources: Police reports and a national database of criminal charges and convictions maintained by the Canadian Police Information Centre (CPIC), a service of the Royal Canadian Mounted Police (RCMP). Some investigative files also had offense information from correctional reports. We focused our analyses on sexual recidivism (including child pornography, noncontact sexual offenses such as indecent exposure, and contact sexual offenses) and any child pornography recidivism.

Follow-Up Time and Recidivism Coding

Our procedure for calculating follow-up time emulated the development study (see Seto & Eke, 2015). Briefly, we calculated follow-up time as the difference between the date of first release from the index child pornography charge(s) (e.g., release on bail, release at conviction) and the date when criminal records were checked, which in this study was the end of summer 2015. Time in custody (e.g., time in jail for the index or any subsequent offense) was subtracted, so follow-up time represented the individual's opportunity to offend while residing in the community ($M = 7.1$ years, $SD = 1.6$ years; range = 0.3-10.1 years). Similar to the development sample, we conducted a 5-year fixed follow-up analysis to control for variability in follow-up time; 80 of 86 offenders had at least 5 years at risk. We coded whether an individual committed a new offense within the 5-year follow-up period, and any new offenses committed after 5 years at risk were not counted. Fixed follow-ups tend to reduce random variation in a study (see Hanson & Morton-Bourgon, 2009; Harris & Rice, 2003). Follow-up time and recidivism data were coded by a second research assistant who was unfamiliar with the CPORT and CASIC and was blind to the original data coding, including CPORT and CASIC scores.

Interrater Reliability

We examined interrater reliability using cases coded at the beginning, middle, and end of the study coding period, to check for drift in reliability over time; no drift was observed. Any disagreements in coding were resolved by consensus between coders. Reliabilities for the main study variables and tools were assessed using 15 cases (17% of the sample) coded by two raters: intraclass correlation coefficients (two-way random model, absolute agreement) for all reported continuous variables (e.g., offender age) were a minimum of .75 for single measures (the high end of the range was 1.00). For categorical variables (e.g., CPORT Item 1; offender aged 35 years or younger), kappas were .80 or higher (1.00). The reliability of the CPORT total score was high (.93 for single measures), as was scoring the variables for the CASIC total score (.98 for single measures).

For the purpose of assessing interrater reliabilities for follow-up time and recidivism variables, 18 cases (21% of the sample) were coded; these were randomly selected across the data file and, as previously indicated, included a coder blind to the original coding and with no familiarity with CPORT or CASIC. For all reported continuous variables, the intraclass correlation coefficients were a minimum of .75 for single measures and .80 for average measures (the high end of the range was 1.00); kappas were .80 or higher (1.00) for categorical variables.

Overview of Analyses

All analyses were conducted using fixed 5-year rates of recidivism. Relative predictive accuracy (i.e., discrimination) of the CPORT items and total scores was assessed using the Area Under the Curve (AUC) from Receiver Operating Characteristic (ROC) analyses. AUC values can range between 0 and 1, representing the proportion of recidivists who obtained a higher score on the CPORT than nonrecidivists; scores closer to 1 indicate better positive predictive accuracy. AUCs of .56, .64, and .71 were considered small, moderate, and large effect sizes, respectively, as they roughly correspond to Cohen's *d* values of .20, .50, and .80 (Rice & Harris, 2005).

Predicted recidivism rates for CPORT scores were calculated using logistic regression (Hosmer, Lemeshow, & Sturdivant, 2013) to estimate two parameters: B_1 (slope) and B_0 (intercept). The slope coefficients are log odds ratios, which were transformed to odds ratios for easier interpretation. The odds ratio indicates the extent to which the odds of recidivism increases with each one-point increase in the CPORT. The intercept provides the recidivism rate for offenders with a CPORT score of 0. For ease of interpretation, intercept values were transformed from their original metric (log odds) into probabilities (p), where $p = e^{\text{LOGIT}} / (1 + e^{\text{LOGIT}})$. Recidivism estimates per score on the CPORT were calculated with the B_1 and B_0 still in their untransformed metrics (log odds ratios and log odds), where each recidivism estimate (in log odds) was calculated by multiplying the CPORT score by the B_1, and adding that product to the B_0. Using the formula as above, all recidivism estimates were transformed into percentages.

Table 1. Fixed 5-Year Recidivism Rates.

		Any sexual		Child pornography	
Group	*n*	*n* recidivism	% Recidivism	*n* recidivism	% Recidivism
All offenders	346	40	11.6	29	8.4
Development sample	266	28	10.5	22	8.2
Validation sample	80	12	15.0	7	8.8
CP/NC	279	23	8.2	17	6.1
Development sample	218	17	7.8	14	6.4
Validation sample	61	6	9.8	3	4.9
CP + C[a]	67	17	25.4	12	17.9
Development sample	48	11	22.9	8	16.7
Validation sample	19	6	31.6	4	21.1

Note. CP/NC = child pornography/noncontact offenders; CP + C = child pornography + contact sexual offenders.
[a]CP + C offenders are significantly more likely to have both sexual recidivism, $\chi^2(1) = 15.51$, $N = 306$, $p < .001$, and any child pornography recidivism, $\chi^2(1) = 9.83$, $N = 346$, $p = .002$ compared with CP/NC offenders.

Table 2. Fixed 5-Year Follow-Up: Differences in CPORT Scores Based on Offense Type.

	CP/NC offenders			CP + C offenders			Effect size	
	n	*M*	*SD*	*n*	*M*	*SD*	*d*	95% CI
Development	207	1.54	1.21	47	3.79	1.71	−1.71	[–2.06, –1.36]
Validation	43	1.42	1.30	12	3.17	1.90	−1.21	[–1.89, –0.53]
Combined	250	1.52	1.23	59	3.66	1.75	−1.59	[–1.90, –1.28]

Note. The CPORT scores include only cases with no missing information. CASIC substitutions for CPORT Item 5 were not included in the scoring of CPORT. CPORT = Child Pornography Offender Risk Tool; CP/NC = child pornography/noncontact offenders; CP + C = child pornography + contact sexual offenders; CI = confidence interval; CASIC = Correlates of Admission of Sexual Interest in Children.

Results

Table 1 lists the sexual and child pornography recidivism rates for a fixed 5-year follow-up period for all offenders, as well as separated by offender type and divided into the development and validation sample. The recidivism rates were much higher for individuals with both child pornography and contact sex offenses (CP + C). Table 2 examines CPORT scores; after combining both samples, CP + C offenders scored roughly 1.5 *SD* higher than the CP/NC group on the CPORT. This difference represents close to two points (1.75 points) on the scale. One point is explained by all CP + C offenders having the risk point for contact sex offenses, but in addition to that, they had almost another risk point on average compared with CP/NC offenders. This was mostly explained by the prior criminal history item, which was more likely to be endorsed for CP + C offenders (58% vs. 36% for the CP/NC group in the validation sample and 79% vs. 32% in the combined sample).

Relative Predictive Accuracy (Discrimination) of CPORT Items and Scores

Table 3 presents the predictive accuracy of CPORT total scores for any sexual and specifically child pornography recidivism. In addition to presenting overall results, the table also separates the results by offender type and development versus validation sample. The effect sizes for the individual CPORT items were not significantly different from the effect sizes from the development sample, using the formula for testing AUCs between groups from Hanley and McNeil (1983); individual item analyses for the development, validation, and combined samples are available in Online Supplement A, separated for CP/NC and CP + C. The CPORT total score approached a large effect size in predicting sexual recidivism (AUC = .70). When restricted to 55 cases with no missing information, the AUC had a large effect size (AUC = .72) but was no longer statistically significant due to lower power. For child pornography recidivism analyses, which had even lower power, CPORT total score effect sizes dropped to medium (all cases) and small (55 cases with no missing information) in magnitude. Analyses testing the differences between the AUCs for the development and validation sample for both sexual and child pornography recidivism found no significant differences in predictive accuracy (see Online Supplement B). Consequently, results from the validation sample are consistent with the development sample and within expected sampling error. Given the similarity in findings between the development and validation sample, the rest of this subsection will focus on the combination of the two.

Combined Sample

In the combined sample (Table 3), all CPORT items and total scores significantly predicted any sexual and specifically child pornography recidivism, with minor exceptions. The effect size for age (below 35 years) was .61 in the development sample and .57 in the combined sample; arguably, it remained meaningful in magnitude (Mann, Hanson, & Thornton, 2010, suggest a Cohen's *d* of .15 is large enough to be meaningful for assessment and treatment, which is roughly equivalent to an AUC of .54, following Rice & Harris, 2005). For both recidivism outcomes, the total CPORT score (with or without missing information included) exceeded large effect sizes (AUCs ≥ .71). Restricting the combined sample to cases with complete information, however, increased the AUCs (from .72-.74 to .75-.77).

Separating the analyses by offender type, in the combined sample, AUCs for CPORT total scores (with and without missing information) were lower for the CP/NC group compared with the CP + C group. For example, AUCs for CPORT total scores (including all cases) were .66 for CP/NC offenders compared with .72 for CP + C offenders. Confidence intervals for the CP + C group, however, were quite wide due to small sample size (depending on the analysis, *n*s vary between 59 and 67). For item analyses (see Online Supplement A), effect sizes were higher for the CP + C group in nine out of 12 analyses.

Table 3. Predictive Accuracy (5-Year Follow-Up) of CPORT Total Scores—Any Sexual Recidivism or Any Child Pornography Recidivism.

	All offenders			CP/NC offenders			CP + C offenders		
	n	AUC	95% CI	*n*	AUC	95% CI	*n*	AUC	95% CI
Any sexual recidivism									
Development sample									
CPORT total (all cases)	266	**.737**	[0.631, 0.843]	218	**.671**	[0.529, 0.813]	48	**.794**	[0.626, 0.961]
CPORT (no missing information)	254	**.759**	[0.660, 0.859]	207	**.704**	[0.571, 0.836]	47	**.795**	[0.629, 0.962]
Validation sample									
CPORT total (all cases)	80	**.698**	[0.541, 0.855]	61	.652	[0.421, 0.882]	19	.615	[0.321, 0.910]
CPORT (no missing information)	55	.719	[0.463, 0.976]	43	.604	[0.204, 1.000]	12	.778	[0.429, 1.000]
Combined sample									
CPORT total (all cases)	346	**.724**	[0.636, 0.812]	279	**.664**	[0.543, 0.785]	67	**.717**	[0.559, 0.875]
CPORT (no missing information)	309	**.752**	[0.658, 0.845]	250	**.688**	[0.559, 0.816]	59	**.787**	[0.634, 0.939]
Any child pornography recidivism									
Development sample									
CPORT total (all cases)	266	**.763**	[0.645, 0.881]	218	**.709**	[0.551, 0.868]	48	**.873**	[0.721, 1.000]
CPORT (no missing information)	254	**.793**	[0.687, 0.898]	207	**.753**	[0.612, 0.894]	47	**.875**	[0.725, 1.000]
Validation sample									
CPORT total (all cases)	80	.668	[0.458, 0.879]	61	.569	[0.217, 0.920]	19	.592	[0.255, 0.929]
CPORT (no missing information)	55	.557	[0.000, 1.00]	43	.143	[0.000, 0.334]	12	**1.000**	[1.000, 1.000]
Combined sample									
CPORT total (all cases)	346	**.740**	[0.637, 0.844]	279	**.685**	[0.538, 0.832]	67	**.767**	[0.592, 0.943]
CPORT (no missing information)	309	**.771**	[0.657, 0.885]	250	**.705**	[0.550, 0.861]	59	**.896**	[0.767, 1.000]

Note. Due to ongoing data cleaning, there may be slight fluctuations from the data reported in Seto and Eke (2015). There are no changes to the significance of individual items or total scores in the development sample; however, there may be slight changes in overall AUC or 95% CI. For example, compared with the text in Seto and Eke (2015, p. 426), the 95% CI for CPORT score with no missing information (predicting any sexual recidivism) is now reported as [.660, .859], rather than [.66, .85]. CASIC substitutions for CPORT Item 5 were not included in the scoring of the CPORT. CPORT = Child Pornography Offender Risk Tool; CP/NC = child pornography/noncontact offenders; CP + C = child pornography + contact sexual offenders; AUC = area under the curve; CI = confidence interval; CASIC = Correlates of Admission of Sexual Interest in Children. An AUC value is signficantly different from chance and is bolded when the 95% CI does not include 0.5.

Table 4. Predictive Accuracy for CPORT, Examining Missing Information, and CASIC Substitution (Combined Sample) in the Fixed 5-Year Follow-Up.

	CP/NC offenders			CP + C offenders		
Item	*n*	AUC	95% CI	*n*	AUC	95% CI
Any sexual recidivism						
CASIC total score (all cases)	277	.572	[0.442, 0.703]	67	.587	[0.428, 0.747]
CASIC total score (no cases missing)	216	.564	[0.427, 0.701]	45	.651	[0.480, 0.823]
CPORT total (all cases)	279	**.664**	[0.543, 0.785]	67	**.717**	[0.559, 0.875]
CPORT (no missing information)	250	**.688**	[0.559, 0.816]	59	**.787**	[0.634, 0.939]
CPORT maximum one item missing, CASIC replaces missing Item 5	273	**.683**	[0.561, 0.805]	66	**.717**	[0.559, 0.874]
Child pornography recidivism						
CASIC total score	277	.590	[0.443, 0.737]	67	.582	[0.402, 0.761]
CASIC total score (no cases missing)	216	.533	[0.374, 0.692]	45	**.708**	[0.540, 0.876]
CPORT total (all cases)	279	**.685**	[0.538, 0.832]	67	**.767**	[0.592, 0.943]
CPORT (no missing information)	250	**.705**	[0.550, 0.861]	59	**.896**	[0.767, 1.000]
CPORT maximum one item missing, CASIC replaces missing Item 5	273	**.696**	[0.545, 0.846]	66	**.767**	[0.591, 0.942]

Note. CPORT = Child Pornography Offender Risk Tool; CASIC = Correlates of Admission of Sexual Interest in Children; CP = child pornography; AUC = area under the curve; CI = confidence interval. An AUC value is significantly different from chance and is bolded when the 95% confidence interval does not include 0.5.

Missing information and CASIC substitution. Table 4 presents AUCs with the combined sample (fixed 5-year follow-up) for the CASIC (including all cases, or restricted to cases with no missing information), as well as for the CPORT total scores with and without missing information (repeated from Table 3), and for CPORT total scores where CASIC scores of 3 or higher were used to substitute for missing information[5] on Item 5[6] (a total of 25 cases, 7%, of the combined fixed 5-year follow-up). Substituting CASIC scores for missing information on Item 5 and allowing one additional CPORT item missing, CPORT total scores had AUCs that were generally intermediate between those of the CPORT using all cases and then restricted to only cases with complete information. Given that missing information is an occasional reality in applied risk assessment (e.g., clinical practice, police threat assessments, probation and parole), the following analyses and normative data for the CPORT used these guidelines for missing information.

Recidivism Estimates Based on CPORT Scores

Logistic regression analyses were used to produce recidivism estimates for CPORT scores (presented in Table 5), combining scores of five and higher because there were relatively few such individuals. In addition, analyses were conducted for the overall sample, as well as separated for the development and validation samples, and by offender type; Online Supplement C provides the detailed results of each logistic regression analysis used for this section. Across all 18 analyses, odds ratios for the

Table 5. Observed and Predicted 5-Year Recidivism Probabilities for the CPORT.

	Combined sample			Observed recidivism rate (%)			Recidivism estimates derived from logistic regression				
							Combined sample	Seto and Eke (2015) development	Validation sample only	CP/NC combined sample	CP + C combined sample
CPORT score	% of sample	*n*	*N* recid	Combined	CP/NC	CP + C	% recid	% recid	% recid	% recid	% recid
Any sexual recidivism											
0	18	61	3	4.9	4.9	0.0	3	2	5	3	5
1	28	95	3	3.2	3.4	0.0	6	5	9	6	8
2	23	78	11	14.1	11.1	26.7	10	9	15	9	13
3	15	52	6	11.5	12.2	9.1	16	15	23	14	20
4	10	34	8	23.5	29.4	17.6	26	26	34	22	30
5+	6	19	9	47.4	0.0	52.9	40	40	48	32	43
Total	100	339	40	11.8	8.4	25.8					
Any child pornography recidivism											
0	18	61	3	4.9	4.9	0.0	2	—	4	2	2
1	28	95	1	1.1	1.1	0.0	4	—	6	4	3
2	23	78	6	7.7	6.3	13.3	7	—	9	7	7
3	15	52	6	11.5	12.2	9.1	12	—	13	11	12
4	10	34	6	17.6	23.5	11.8	20	—	19	18	21
5+	6	19	7	36.8	0.0	41.2	32	—	26	27	35
Total	100	339	29	8.6	6.2	18.2					

Note. In the combined and validation samples, the CPORT total scores were restricted to cases with no more than one item with missing information (excluding Item 5, where CASIC scores of 3+ were used as a substitute), resulting in a sample of 339 cases. Recidivism estimates for CP/NC and CP + C are subgroups based on the combined sample. Recid = recidivism; CP/NC = child pornography/noncontact offenders; CP + C = child pornography + contact sexual offenders; CPORT = Child Pornography Offender Risk Tool; CASIC = Correlates of Admission of Sexual Interest in Children.

CPORT ranged between 1.24 and 3.85, with a median odds ratio of 1.75. That means that, on average, each one-point increase in CPORT scores is associated with approximately a 75% increase in the odds of recidivism. The Hosmer–Lemeshow test was nonsignificant in 17 out of 18 analyses, demonstrating that the data generally followed the logistic distribution assumption.[7]

Table 5 provides sample sizes and observed recidivism rates for each CPORT total score (combining scores of 5+), as well as the predicted recidivism rates from logistic regression for various groups. The predicted sexual recidivism rates by score for the validation sample were roughly 50% higher than the development sample (from Seto & Eke, 2015), although the sample size was quite small (n = 73 from the validation sample). These sexual recidivism estimates from the validation sample alone should be considered unstable as there were only 12 recidivists. Adding the validation sample to the development sample resulted in almost identical sexual recidivism rate estimates (all within 1 percentage point) compared with the development sample on its own (from Seto & Eke, 2015). Although this is promising, the validation sample is small, therefore, as stated in the CPORT guide (see Eke & Seto, 2016), we recommend against using these estimates for applied risk assessments without further independent validation research.

Child pornography recidivism estimates are presented for the first time in this study. Given that this was included in the definition of any sexual recidivism, child pornography recidivism estimates are lower at each score. Child pornography recidivism estimates from the validation sample alone should be considered fairly unstable as there were only seven recidivists. Combined with the validation sample, the number of recidivists increases to 29, making the child pornography recidivism estimates more credible. However, even in the combined sample, the number of recidivists is insufficient for stable recidivism estimates; for example, Vergouwe, Steyerberg, Eijkemans, and Habbeman (2005) suggested that at least 100 recidivists would be necessary for stable logistic regression models.

Table 5 also presents recidivism estimates separately for CP/NC offenders compared with CP + C offenders. Although the overall base rate of recidivism (any sexual or child pornography recidivism) was roughly 3 times higher for CP + C compared with CP/NC, this group also had much higher average CPORT scores (roughly 1.5 *SD* higher). The predicted sexual recidivism rates for each CPORT score were roughly 30% higher for CP + C offenders (see also Figure 2). For child pornography recidivism, recidivism rates per score were fairly similar, although the CP + C individuals had higher recidivism rates for the highest CPORT scores. Reflecting their higher proportion in the sample, the recidivism rates for the CP/NC group are very similar to the overall recidivism estimates, with only one exception: For sexual recidivism, the predicted recidivism rate for CP/NC offenders with CPORT scores of 5+ was 32%, compared with the overall estimate of 40%.

Discussion

Individuals in the validation sample were generally similar to the development sample. Overall, the CPORT performed similarly to the development sample, significantly

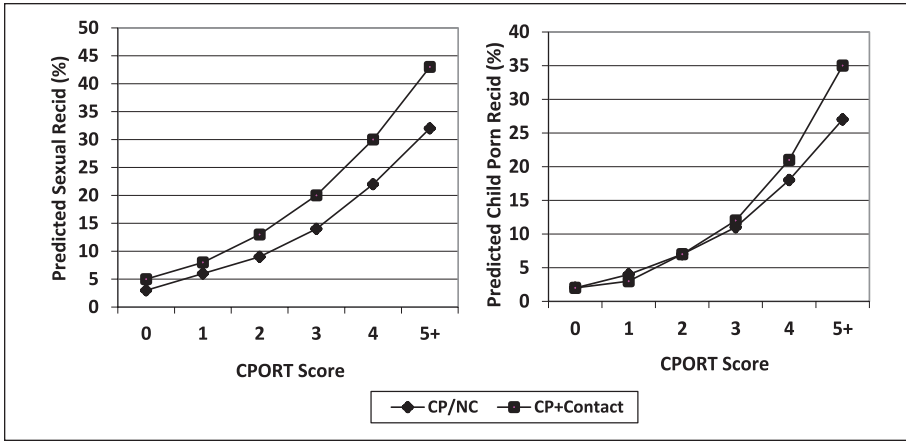

Figure 2. Predicted recidivism rates from CPORT scores for CP/NC (child pornography/noncontact) offenders compared with CP + C (child pornography + contact sexual) offenders.
Note. CPORT = Child Pornography Offender Risk Assessment Tool; Recid = recidivism.

predicting any sexual recidivism. In the combined 5-year fixed follow-up sample of 346 men convicted of child pornography offenses, the CPORT significantly predicted any sexual recidivism as well as child pornography recidivism specifically, both with large effect sizes.

The current work also assessed for missing information. Although complete data are always preferred, the reality of applied risk assessment is that some information may be unavailable. This highlights the importance of developing rules for missing data and the relevance of using tools per their guidelines (for a discussion on the importance of implementation of risk assessments, see Helmus, 2015, https://sajrt.blogspot.co.nz/2015/11/what-makes-good-risk-assessment-note-on.html).

CPORT total scores with or without missing information significantly predicted any sexual recidivism and child pornography recidivism; furthermore, CPORT scores were also significantly predictive of both outcomes when allowing for the replacement of a missing Item 5 (indication of sexual interest in children) with a score of 3 or more on CASIC and allowing for one (other) missing item, consistent with the scoring guidelines (Eke & Seto, 2016).

Although splitting the sample into subsamples based on specific characteristics reduces heterogeneity compared with the original scale development, there has been specific interest in individuals detected for child pornography offenses, but who have no known contact sexual offenses (e.g., Babchishin et al., 2015; Seto, 2013); a key question for many is the risk that individuals with no identified contact sexual offense will go on to commit such an offense (Eke & Seto, 2012). Unfortunately, sample size precluded an examination of contact sexual recidivism as an outcome, with 13 contact sexual recidivists in the combined fixed follow-up sample.

We also separated analyses for individuals based on current or previous criminal charges for contact sexual offenses. Total CPORT scores (with full information as well as with missing information) were significantly predictive of any sexual recidivism and child pornography recidivism for individuals with or without a known contact sexual offending history, though AUCs tended to be lower for the latter group. Recidivism estimates were fairly similar for both groups, although CP + C offenders had higher estimates at higher scores. We did not separate individuals with child pornography offenses who had no other type of offending. This is a lower risk subgroup that is lower in general criminality (a well-established risk dimension for all offenders) that receives lower scores on the CPORT than the same person with other criminal history, and concomitantly has lower recidivism rates. In the current study, we focused on only two subgroups: child pornography offenders with or without contact sexual offenses, a distinction that has been the focus of prior research on individuals with online sexual offenses. Although child pornography offenders with a contact sex offending history can be assessed for risk of sexual recidivism using other sex offender risk scales, there are no risk scales designed to assess risk of sexual recidivism among child pornography offenders with only a nonsexual offense history. This subgroup was combined with child pornography offenders with no other offense history; they are both in need of a risk scale for sexual recidivism, and combining them retains variability in general criminality as a relevant risk domain. Individuals with child pornography offenses with no other known offending do not all rank similarly (e.g., an individual may have a prior child pornography offense, an indication of sexual interest in children, or preference for child material involving males). Future research that includes additional psychologically meaningful variables (e.g., clinically assessed variables relating to loneliness, sexual preferences, emotional congruence) could better inform our understanding of risk among those with little or no other criminal history.

Our findings, though low in power, may fit prior research (e.g., Babchishin et al., 2015) suggesting child pornography offenders with and without contact sexual offenses may be meaningfully different groups. In the future, with sufficient replication and larger samples, there may be separate recidivism estimates developed for child pornography offenders with or without contact sexual offending, as well as recidivism estimates developed specifically for contact sexual recidivism. Additional research is needed to more fully understand differences between child pornography offenders with versus without contact sexual offending, and how to incorporate that into applied risk assessment practices.

Limitations

The validation sample was small, resulting in low statistical power. This was particularly evident when assessing individual CPORT items. Consequently, we focused primarily on comparisons of effect size magnitude, as opposed to statistical significance.

As we noted earlier, unlike the development sample, none of the current sample had prior child pornography charges; this is, in part, because an individual with a prior

child pornography offense investigated by the same police service would have been in the original development sample. We did not select cases with no prior child pornography offenses, as individuals could have had prior offenses from another jurisdiction, but none did in this study. In addition, although we grouped individuals based on prior and current offending, some individuals in the CP/NC group will have had an undetected (or later detected) contact sexual offense.

The current sample was also based on the same geographic area, assessed adult males convicted of child pornography offenses, and, as in the development sample, focused on police investigation files. The CPORT has yet to be validated in other jurisdictions, using clinically obtained assessment data, among nonconvicted offenders (e.g., those charged with a child pornography offense and awaiting trial), or among juvenile or female offenders. With additional research, CPORT may change with regard to *how* it is used.

CPORT and CASIC: Use in Applied Risk Evaluations and Future Research

The current work provides additional empirical support for use of the CPORT in the prediction of sexual recidivism as well as specifically child pornography recidivism. Although scores may be helpful for comparing individuals, given the small sample sizes and fluctuations in recidivism rates in the development and validation sample, we caution against reporting recidivism estimates at this time, until further research is conducted with different and larger samples.

Many CPORT items have been supported as sexual recidivism risk factors in previous research, and the two new child content items are psychologically meaningful (Hanson & Bussière, 1998; Hanson & Morton-Bourgon, 2005; Mann et al., 2010). However, CPORT does not include other potentially relevant risk or protective factors, including some psychologically meaningful factors such as emotional congruence with children, offense supportive cognitions, or dynamic risk markers (e.g., current substance use, hostility). With more research involving samples with access to additional information, CPORT may change with regard to *content*.

The benefit of the CPORT and CASIC research to date is twofold: (a) the work provides initial empirical validation of some risk factors among child pornography offenders and (b) the tools provide a mechanism for sharing relevant information across stakeholders. The individual item responses, as well as the notes assessors include (such as the rationale for scoring an item positively or negatively), can communicate risk-relevant information for treatment and case management. Research with professionals working in the areas of child sexual exploitation and contact sexual offending against children suggests a number of barriers exist in the communication and flow of case-specific as well as offender-specific details (e.g., see Glasgow, 2012; Martin & Slane, 2015). This is important because a goal in risk-informed collaboration relates not only to predicting outcomes but also sharing information to assist in identifying priorities for intervention and case management (e.g., see Kroner, Gray, & Goodrich, 2013; Mills, Kroner, & Morgan, 2011).

The CPORT was developed to predict persistence in offending among those detected for child pornography offenses. It has some overlap with other risk tools, which is not surprising given what is known about the dimensions underlying risk to reoffend in general (e.g., criminal history is a reliable risk factor in sexual and nonsexual offenders, adults and juveniles, men and women). Thus, CPORT and Static-99R have some similar items (e.g., relevance of criminal history, sexual interests, offending involving male children) and both are static in nature. Unlike the CPORT, the Static-99R cannot be used with child pornography offenders who have not committed contact or noncontact sexual offenses involving a direct victim. It is also less clear how well the Static-99R would apply for individuals with current child pornography offenses and historical contact offenses committed many years ago. The CPORT and Static-99R also predict different outcomes, with the CPORT predicting any sexual recidivism (contact, CP, other noncontact) and child pornography recidivism specifically. As well, the corresponding percentile ranks would differ because the two measures use different reference groups. Whereas dual offenders would be in the higher range on the CPORT (they receive an extra point for the contact sexual offense), they might be similar to or lower than typical Static-99R samples. Unlike other measures, the CPORT captures items relating to the characteristics of child pornography and other child-related content.

Some offenders identified as having no prior reported contact sexual offenses will self-report committing such offenses against children (e.g., estimates of approximately half, see Bourke et al., 2014; Seto et al., 2011). In our samples, some offenders were charged with previously undetected (historical) contact sexual offenses against children. Of interest will be methods or tools that help identify those most likely to have previously unidentified, undetected contact sexual offense(s). This is important for victim identification as well as to potentially assist our understanding of future risk of offending. Researchers in the United Kingdom developed the KIRAT (Long, Alison, Tejeiro, Hendricks, & Giles, 2016) to assist police in prioritizing suspects involved with indecent images of children by identifying those who were more likely to have already committed a contact sexual offense. This is not the same task as identifying those who are at higher risk of recidivism, that is, offending in the future.

Also of interest is the trajectory of offending. For example, in some of our current cases, the child pornography charge came after the contact offending, and these offenses appeared to be truly separate, rather than a delayed child pornography charge in investigations for contact sexual offending. As well, when we examine recidivism, some individuals known only for their child pornography offending go on to commit a contact sexual offense against a child. A concern for many is whether accessing child exploitation material is a “gateway” for future contact sexual offending—and, more specifically, for whom it might be a gateway offense. It would helpful to study the timing of offenses in a cohort of individuals charged or convicted of child pornography. Such research has been conducted in other areas of offending, with a focus on the relevance for risk assessment (e.g., intimate partner violence; Hilton & Eke, 2016).

Authors' Note

Results from this research were presented at the 2016 conference of the Association for the Treatment of Sexual Abusers, Orlando, Florida. Opinions expressed are those of the authors.

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Notes

1. Within this article, the original sample sizes are used to provide descriptive information about cases and overall CPORT and CASIC scores, whereas 5-year fixed follow-up samples are used in predictive analyses.
2. Two cases involving females were excluded during our review; one female was a contact sex offender who documented her sexual offending, thereby creating child pornography, and the second was co-accused of offending with a male family member.
3. Accessing child pornography, such as viewing it online without retaining a copy, is against the law in Canada.
4. One offender also had an offense related to juvenile prostitution for driving "escorts" to their appointments, but as with the Static-99R coding rules (Phenix et al., 2016), this was not considered a sexually motivated offense.
5. We substituted CASIC scores when Item 5 was missing; we did not use it as a substitute when the response to CPORT Item 5 was negative (e.g., the individual indicated they are not sexually interested in children).
6. We used a CASIC score as a substitute for a missing Item 5 on CPORT, when CASIC scores were missing a maximum of 1 item (as per the scoring guide). However, in the development and validation samples, few CASIC items were missing, with very few cases missing more than one item (1.6%). It is defensible to use a CASIC score of 3 or more as a

1 for a missing CPORT Item 5, regardless of the number of CASIC items missing, because the cutoff has been reached. However, we do not recommend using scores of less than 3 (for negative scores) when more than 1 item is missing; missing items could, if known, add to the CASIC score.

7. Given that roughly one test would be expected to be significant based on chance alone (Type I error), we were not concerned about this single violation.

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