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Public perception of individuals who commit Child Sexual Abuse Material offences: Exploring the impact of demographic variables and cross-national differences

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ABSTRACT

Background: Lay perceptions of persons who download and distribute Child Sexual Abuse Material (CSAM) is an underexplored subject. There is a need for understanding the factors that influence perceptions as the public perceptions have implications for endorsement of sex offender rehabilitation that in turn can influence the availability of treatment programs and stigma for help-seeking.

Objective: To explore public perceptions of individuals that commit child sexual abuse offences, to compare the results to those obtained in a large US sample, and to explore associations between demographic variables, general perceptions and endorsement of imprisonment and treatment for individuals that commit CSAM offences.

Participants and setting: An online survey were distributed in Norway in February 2023. 618 individuals responded, 76 % were female, mean age 34.99 (SD = 14.23), the majority (>70 %) had higher education, and 44 % had children.

Results: Consistent with prior research, the public perceptions overestimated the risk of future contact offences and recidivism. Women overestimated the percentage of risk of contact offences and pedophilic interest more than men. The overestimation was significantly less in this sample compared to the US sample ($d = 0.39-0.96$). Those working with online child abuse had perceptions of persons committing CSAM offences that were more aligned with empirical findings. Demographic variables were only marginally associated with endorsement for treatment and imprisonment, except for having children, which was associated with endorsement of imprisonment. Perceived risk of contact offences, pedophilic preference, and assumed childhood sexual victimization were associated with perceptions of individuals committing CSAM offences as different than those committing physical sexual abuse and both endorsement of treatment and imprisonment. Conclusions.

The perceptions of those who commit CSAM offences showed a stronger association with endorsement for treatment and imprisonment than demographic variables.

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1. Introduction

Online child sexual abuse encompasses a range of offences, including the accessing, viewing, distribution, and production of child sexual abuse material (CSAM), colloquially referred to as child pornography (CP). As the term child pornography is argued to be misleading, given that pornography is a term primarily used for adults engaging in consensual act, and hence, the use of the term can trivialize the abuse, there is a consensus within the field to replace the term with CSAM or child sexual exploitation material (CSEM) (Greijer et al., 2016). The numbers of individuals who commit CSAM offences is growing rapidly, with the Internet Watch Foundation having received 375,230 reports of CSAM in 2022 (IWF, 2023), presenting a continuously increasing social challenge (Armitage et al., 2023; Seto, 2021; Sunde, 2020). The problem of online CSAM is also growing more complex with the increase in consensually produced but involuntarily shared images as well as the proliferation of artificial intelligence (AI)-generated images alongside the historically prevalent adult-produced abuse images (Finkelhor et al., 2023). These changes in the CSAM offence landscape have been reflected in popular media reporting, shaping the public's perceptions and understanding of individuals who commit CSAM offences.

1.1. Public perceptions of individuals that commit CSAM offences

Understanding the public perception of individuals who commit CSAM offences, and their actions is a subset of a broader need to understand the overall public perceptions of those who commit crimes. Having an accurate understanding of the public's opinions and beliefs related to CSAM offending helps to target education campaigns, identify potential areas of stigma, and develop evidence-based prosecution and sentencing guidelines (Steel, Newman, O'Rourke, Quayle, 2022a, Hunn et al., 2022).

In one of the initial works in understanding the perception of crime, McCorkle (1993) polled members of the public on their opinions of six common crimes, finding strong support for both punitive and, paradoxically, rehabilitative approaches from participants. This research was extended by Brown (1999) looking specifically at the public perceptions of sex offenders. Brown found support for both incarceration and treatment during incarceration, but noted there were demographic differences in support for community-based treatment.

CSAM offenders are generally considered to be a subset of sex offenders, including other child sex offenders, but research has identified significant differences. Recent research suggests that person who commit non-contact CSAM offences have psychological profiles that are distinct from those who commit contact offenders (Henshaw et al., 2017; Lim et al., 2021; Ly et al., 2018). Additionally, evidence suggests that these individuals are younger, have a higher degree of education, and commit fewer non-CSAM related criminal acts than those committing contact offences (Babchishin et al., 2015; Garrington et al., 2018; Webb et al., 2007). Individuals that commit non-contact CSAM offences are also relatively high functioning when compared to contact offenders, have greater access to and usage of the internet, less access to children, and exhibit higher amounts of sexual deviance (Babchishin et al., 2015; Babchishin et al., 2018; Henshaw et al., 2017). While there is substantial research on the public perception of sex offenders in general, the research on the perception of individuals that commit CSAM offences is limited (Steel, Newman, O'Rourke, Quayle, 2022a). The public perceptions of differences between those who commit CSAM offences and those who commit other sex offences, warrant specific investigation, as failure to perceive individuals that commit CSAM offences as a distinct group have implications for both clinical treatment (Paquette et al., 2022) and efficient use of prevention strategies from a cost-benefit perspective (Rimer, 2020; Steel, Newman, O'Rourke, Quayle, 2022a).

1.2. Specific misperceptions

Steel et al. (2021), identified gaps between the public perceptions of CSAM offenders and what research findings showed in several key areas in a United States-based sample. These included the overestimation of prevalence of pedophilia, the risk of contact offending, the recidivism risk, and mental health status of individuals who commit CSAM offences.

In the study by Steel, Newman, O'Rourke, Quayle (2022a), the sample estimated that 78.56 % of individuals committing CSAM offences had a pedophile preference. Although pedophilic interest is an important driver of CSAM behavior (Seto et al., 2015), it is not the sole and sometimes not the primary motivator. Novelty seeking and other problematic internet and pornography use in general are equally important for some individuals (Steel et al., 2021). Further, some CSAM users describe their use as an addiction, and have reported exhibiting withdrawal symptoms (Rimer & Holt, 2023). Most studies have identified <50 % of offenders as having a pedophilic preference (Babchishin et al., 2015; Lam et al., 2010; Paquette et al., 2022; Seto, 2021), however at least one study of individuals imprisoned for CSAM offences identified rates as high as 65% for pedophilic disorder (Seiser et al., 2023).

Exact figures on recidivism rates for sexual offending is not established, due to challenges both in terms of conceptualization and measurement (Lussier et al., 2023). However, the literature suggests that recidivism rates for those committing CSAM-only offences are lower than for other sex offenders, including mixed offenders who have committed both CSAM and contact offences. Research in one study found that the recidivism rate for CSAM-only offenders, for both new contact offences and new CSAM offences is <10 % (Babchishin et al., 2015). In other research, approximately 5 % of CSAM offenders in nine recidivism studies were found to have committed a new sexual offence during follow-up periods ranging from 1.5 to 6 years (Seto, 2021; Seto et al., 2011), and approximately 2 % of these committed a contact sexual offence (Seto, 2021; Seto et al., 2011). A follow-up study identified that 9,5 % of a sample of individuals arrested for CSAM offences committed a contact child sexual offence within a three-year period (Bissias et al., 2016). Additionally, 12.5 % (one in eight) of individuals committing CSAM-only offences have a sexual offence history in their criminal records, and approximately 50 % have such history if self-reporting is included (Seto, 2021; Seto et al., 2011). Another study showed that 36,5 % of a sample composed of Australian young adults held the belief that viewing CSAM would progress to both other CSAM

offences as well as transgress to physical child sexual abuse (Hunn et al., 2022).

Those who commit mixed offences have higher reoffending rates than those committing CSAM-only offences. A meta-analysis found that those having been convicted of a contact sex offence committed additional offences at a rate of 6 %, compared to individuals committing CSAM-only offences at 0.2 % (Babchishin et al., 2015). In a later study following convicted mixed offenders in Canada for 5 years it was reported that 29 % of the sample committed new offences within the 5-year follow-up period, with 11 % committing a new sexual offence (3 % committed a new contact sexual offence against a minor), while 9 % committed a new CSAM offence (Seto, 2021). Contact-only sex offenders against children (those with no known CSAM offence), on the other hand, have a recidivism rate at 13 % within 5 years (Babchishin et al., 2015; Seto et al., 2011). The public perception of recidivism percentage and risk of contact child sexual offences has been identified as substantially higher, 73.73 % and 62.53 % respectively (Steel, Newman, O'Rourke, Quayle, 2022a). Conflation of online-only CSAM offending with both contact offending and pedophilia provides an incomplete picture of this subgroup, increasing stigma and potentially increasing the risk of re-offending (Seidler, 2010).

Another general perception of CSAM offenders is that they are themselves victims of childhood sexual abuse, i.e., perpetuating the cycle of abuse (Steel, Newman, O'Rourke, Quayle, 2022a). In a sample of 98 men convicted for at least one incident of a CSAM offence, 20 % reported childhood sexual victimization (Paquette et al., 2022), whereas other studies have observed prevalence rates below 12 % (Faust et al., 2015). Childhood victimization in general, and especially polyvictimization (i.e. two or more types of childhood victimization) is associated with various outcome like sex crimes during adolescence, substance abuse and distorted cognitions about the world as dangerous and children as life-partners (Chopin et al., 2022). Further, as adverse childhood experiences are a critical treatment target (Oral et al., 2016), an accurate understanding of these likelihoods can influence both treatment protocols and outcomes.

The effectiveness of many current treatment modalities for sexual offenders has been questioned, with at least one large UK study showing marginal if any effect (Mews et al., 2017). This problem is compounded with CSAM offenders. The increase in CSAM has not only resulted in new methods of victimization, but CSAM users also represent a distinct type of patient requiring different treatment approaches (Lätth et al., 2022; Paquette et al., 2022). A recent meta-analysis showed promising results on the effectiveness of targeted treatment modalities for this community (Gannon et al., 2019), but the inclusion of treatment as a mandated element of the response to CSAM offending remains an unsettled matter of public policy. As the public perceptions of individuals who commit CSAM offences can influence the public policies regarding specialized psychological treatment program (Rimer, 2020) and sentencing guidelines (Henshaw et al., 2017; Steel, Newman, O'Rourke, Quayle, 2022a, 2022b), which in turn can impact the number of children becoming victims of CSAM offences.

In addition to any underlying psychopathology related to their offending behavior, CSAM offenders have a high risk of suicide, their social services support system is often marginal, and stigma and shame can hinder help seeking (Kothari et al., 2021; Steel, Newman, O'Rourke, Quayle, 2022b). Furthermore, many CSAM offenders live with family and children, and the impact on the family is severe. Often no support system is available for dependents as the focus is often on more general protective measures (Armitage et al., 2023). The non-offending families and partners who are impacted by the CSAM use often suffer from mental health issues and it is important to address the shame and isolation they experience (Jones et al., 2023). The factors noted also have implications for traditional sex offender risk assessment tools, as they might not be valid or suitable for use in regard to CSAM offenders (Garrington et al., 2018; Henshaw et al., 2017; Paquette et al., 2022). Consequently, recent risk assessment tools specially designed for this group have been developed, including the Child Pornography Offender Risk Tool (CPORT), that measure risk of recidivism (Seto & Eke, 2015). Because CSAM users have a distinct psychological profile exhibiting significant differences compared to contact offenders (Seto et al., 2012), implementing evidence-based risk tools as a matter of policy requires greater public support and awareness.

The exponential increase in online child sexual abuse has amplified the need for more public knowledge about this group of offenders (Paquette et al., 2022). Public perceptions are often guided more by feelings than they are by facts, which can lead to an inaccurate assessment of risk and suboptimal policy decision making related to individuals who commit CSAM offences (Steel, Newman, O'Rourke, Quayle, 2022a). Psychoeducation is crucial in order to combat stigma, and interventions aiming at reducing stigmatizing attitudes towards sexual offenders have shown promising results (Wurtele, 2021). Integration, recidivism, identification, and risk evaluation are compromised by inaccurate perceptions about those committing online child abuse offences, and although the public view of sex offenders is negative, the public perceptions of those who commit CSAM offences are underexplored (Hunn et al., 2022). Exploring public perceptions of CSAM offenders can be an important avenue for enumerating and targeting stereotypes and designing interventions aiming at increasing general knowledge about CSAM offenders, which can in turn increase support for policy objectives that reduce overall victimization through the reduction of stigma for help-seeking and the support for development for effective treatment. Further, addressing the global problem that CSAM represent, and the need for alternative means for prevention other than treatment, like changing the technological environment in which CSAM offences occur (Quayle, 2020), could be facilitated through reduced lay misperceptions.

1.3. Demographic factors influencing the perceptions

The Community Attitudes Towards Sex Offenders (CATSO) scale shows that attitudes towards sexual offenders often focus on risk perception, punishment, and stereotype endorsement, and both education level and preferred source of news media are correlated with attitudes (Harper & Hogue, 2015). Individuals with pedophilic interest are especially susceptible to public stigmatizing based on cultural norms, regardless of whether they commit an offence (Lehmann et al., 2023). Stigma reduction is important from both a perspective of giving necessary help services to those in need as well as for child protective means, and public perceptions play a crucial part in that reduction (Harper et al., 2022). Some studies have shown that women, compared to men, have more negative perceptions,

and that those with lower education endorse more stereotypic, negative views of sexual offenders (Willis et al., 2013). In a recent study of perceptions of sexual offending in general, women more than men, and those older, compared to younger, estimated a higher risk of recidivism, perceived mental illness of the offender predicted a lower perceived risk of recidivism (Brodie et al., 2023). However, for CSAM offences, less is known about the role of demographic variables.

1.4. Working as a sexual abuse professional

Professionals working with sexual offenders have been found to have a more accurate perception of individuals that commit sexual offences compared to the general population (Fortney et al., 2009). Further, it has been found that professionals working in settings with persons that have committed child sexual abuse have more favorable attitudes towards treatment than students who have had limited exposure to these individuals (Brown & Kloess, 2022). One study identified that members of the general population reported negative attitudes towards rehabilitation of individuals with sexual convictions compared to students of forensic psychology (Rothwell et al., 2021). Whereas the role of demographic variables in perceptions or attitudes towards sexual offenders are inconclusive, having contact with sexual offenders present robust predictions of attitudes towards people who have committed sexual abuse (Harper et al., 2017). Still, among professional experts (psychologists), there is considerable stigmatization and often a failure to discriminate between pedophilic interest and sexual offending in risk assessments (Iffland & Schmidt, 2023). Contrary to their expectations, Harper (2012) found that psychology students had no less stigmatized opinions about sex offenders when compared to non-psychology students, suggesting a lack of specific education even within psychology programs. In contrast, prison employees have been identified as having more positive attitudes towards sex offenders in terms of perceptions of the group as more heterogeneous compared to students' more stereotypical opinions (Kjelsberg & Loos, 2008). Exploring and quantifying these differences in relation to overall public perceptions of individuals that commit CSAM offences has been largely unexplored, with one exception being the study by Mears et al. (2007), finding that men and those less educated were more likely to endorse more severe punishments for accessing CSAM.

1.5. Cultural differences in perceptions of individuals that commit CSAM offences

Fix et al. (2023) point out that individual experiences, sociodemographic factors and cross-cultural differences shape misperceptions of child sexual abuse and support for prevention policies. The largest prior study on the public perceptions of individuals that commit CSAM offences used a sample that was exclusively located in the US and did not extensively investigate differences in demographic subgroups (Steel, Newman, O'Rourke, Quayle, 2022a). Cultural differences in media reporting on crimes in different cultures have been found to vary, and to influence perception differences within those cultures (Dowler et al., 2006). Norway has one of the most progressive criminal systems in the world, mainly based on treatment and deterrence perspective (Bergström et al., 2017). Media coverage of online child abuse cases has additionally been found to shape the public's perceptions of sexual offenders, which can have a direct impact on stigmatization (Harper & Hogue, 2017).

Cross-cultural differences are also evident regarding criminal justice and community responses to sex offenders (Petrunik & Deutschmann, 2008) with internet access and digital literacy having been found to be factors in those differences (Bauer et al., 2002; Frenken, 1999). One study addressing cross-national differences in the prevalence of CSAM downloads and sharing in the population showed similar rates for US and Scandinavian countries, where the percentage in US was marginally lower (Bissias et al., 2016). However, substantial differences between US and Europe have been observed when it comes to endorsement of rehabilitation of sexual offenders (Höing et al., 2016). Even within Europe, there are considerable differences in progress when it comes to treatment of sexual offenders (Frenken, 1999), but scarce, if any research exists on the cross-cultural differences in public perception of CSAM offenders.

Understanding these differences is critical in identifying both cultural resilience factors that can be leveraged and/or vulnerabilities that need to be addressed through public education and interventions, but the magnitude and direction of these differences is frequently non-obvious. As an example, from a related domain, public endorsement of rape myths in a Norwegian sample were found to be consistent with a United States sample (Bendixen et al., 2014; Lys et al., 2022), with Lys et al., (2022, p.16648) concluding that "educational interventions should take into account the role of culture and society". Cross-cultural identification and targeting of public stigmatization in a positive way can be beneficial, and the Norwegian media's response to the #MeToo movement's destigmatization of sexual victimization, for example, had a positive cultural impact (Elnan, 2019).

In general, there is a need for understanding the factors that influence perceptions towards individuals who have committed sexual offences as the perceptions have implications for endorsement and development of sex offender rehabilitation (Brodie et al., 2023; Rothwell et al., 2021). Exploring the public perception of online child abusers and understanding how specific misperceptions are associated with endorsement of treatment, imprisonment, and the perception of these individuals as different than those committing contact child sexual abuse contact in general is a crucial step for targeting stigma and misconception that can hinder efficient treatment.

1.6. Study aim

The current study aims to explore the public perceptions of individuals that commit CSAM offences, specifically the perceived risk of contact offences and recidivism, the perceived prevalence of childhood sexual victimization and pedophilic preference. The study builds on the research of Steel, Newman, O'Rourke, Quayle (2022a). A focal point of this study was to compare the results on public perceptions in this sample to the US sample and to the empirical evidence available. A final important aspect of this study was to

Table 1
Descriptive Statistics and Correlations for Study Variables.

Variable	<i>n</i>	1	2	3	4	5	6	7	8	9	10	11
1. Gender ^a	617	–										
2. Age	612	0.09*	–									
3. Education ^b	618	–0.02	0.29***	–								
4. Has children ^c	616	0.02	0.78***	0.25***	–							
5. Working with topic ^d	470	–0.02	0.13**	0.20***	0.10*	–						
6. Sexually abused as child	573	–0.15***	–0.01	0.04	0.02	–0.09	–					
7. Pedophile preference	571	–0.02	–0.18***	–0.08	–0.12**	–0.19***	0.18***	–				
8. Contact child sexual offenders	573	–0.20***	–0.03	–0.13**	0.07	–0.16***	0.30***	0.42***	–			
9. Recidivist	571	–0.08	–0.00	–0.06	0.10*	–0.11*	0.18***	0.28***	0.36***	–		
10. Treatment ^e	609	–0.09*	–0.05	–0.03	–0.02	–0.12**	0.21***	0.23***	0.18***	0.08	–	
11. Imprison ^e	610	–0.10*	0.06	–0.04	0.15***	–0.12*	0.14***	0.22***	0.34***	0.21***	0.17***	–
12. Different than physical abusers ^f	616	0.14***	–0.08*	0.03	–0.12**	–0.05	–0.20***	–0.17***	–0.31***	–0.24***	–0.17***	–0.24***

* $p < .05$.

** $p < .01$.

*** $p < .001$.

^a 1 = woman, 2 = man.

^b 1 = primary school, 2 = high school, 3 = 1–4 years higher education, 4 = 5–6 years higher education, 5 = 6 or more years higher education.

^c 1 = no, 2 = yes.

^d 1 = no, 2 = yes, working indirectly, 3 = yes, working directly.

^e 1 = totally disagree, 2 = 2, 3 = 3, 4 = neutral, 5 = 5, 6 = 6, 7 = totally agree.

^f 1 = totally disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = totally agree.

explore the association between demographic variables, differences in the perceptions of individuals that commit CSAM offences and the endorsement of imprisonment and treatment. Based on the reviewed literature, we outlined the following hypothesis:

- H1.** Compared to the available empirical evidence, the respondents will overestimate the risk of recidivism, contact offences, the prevalence of pedophilic preference and childhood sexual victimization (i.e., general perceptions) for individuals that commit CSAM offences.
- H2.** Gender, age, having children, and education will be associated with the general perceptions of individuals that commit CSAM offences.
- H3.** There will be significant differences in the perception of individuals that commit CSAM offences in Norway compared to the US sample.
- H4.** Working with the topic will be associated with more nuanced general perceptions of individuals that commit CSAM offences.
- H5.** Gender, age, and education will be significant predictors of endorsement of treatment and imprisonment and perception of individuals that commit CSAM offences are different than those who commit contact child sexual abuse.
- H6.** Working with the topic will be associated with stronger endorsement for treatment, less endorsement for imprisonment and perception of individuals that commit CSAM offences as different than those who commit contact child sexual abuse.
- H7.** General perceptions will be significant predictors of endorsement of treatment and imprisonment, and for perception of individuals that commit CSAM offences are different than those who commit contact child sexual abuse.

2. Method

2.1. Participants and procedure

An online survey (available upon request) was distributed in Norway in February 2023 throughout May. We used the online survey platform, "Nettskjema", developed by the University of Oslo, the official supplier of online survey services at the majority of universities in Norway. A link and a QR-code to the link, was distributed via mail, to professional and personal network, by the authors and ten psychology students that were a part of the project. Because of the viral distribution of the surveys, calculating the response rate was not possible. 618 responded, 76 % were female, mean age 34.99 ($SD = 14.23$), the majority (>70 %) had higher education, and 44 % had children. 230 were students. Of those who worked, 32 (5.2 %) reported that their work was directly related to online child abuse, and 63 (10.2 %) reported that their work was indirectly related to online child sexual abuse by responding to the question "Is online child abuse a topic related to your work?", with the alternatives; "No", "Yes, I work indirectly with the subject", or "Yes, I work directly with the subject". Those working directly with the subject were mainly from the health sector (e.g., psychologists) or the police. Several of the participants did not respond to all the questions, and the exact number of valid responses to each question is presented in [Table 1](#). In the beginning of the survey, Online child abuse was defined as "Online child sexual abuse encompasses downloading, storage and distribution of sexualized pictures/videos of children, referred to as Child sexual abuse material (formerly labeled child pornography)". Regarding choice of word and labels of individuals that commit child sexual offences and CSAM, we follow the Luxembourg guidelines on the terminology in our research ([Terminology & Children, 2016](#)). However, we included the term child pornography to ensure that the respondents would comprehend the statements. The participants did not receive any compensation for their participation.

The protocol and questionnaire were evaluated by the Norwegian Agency for Shared Services in Education and Research (SIKT), that concluded that it was anonymous and in accordance with data protection regulations (REF/NR 830520). The departmental Ethical board at the university approved the study (Reference number 23/004).

2.1.1. Measures

2.1.1.1. Public perceptions of individuals that commit CSAM offences. The survey included various questions and statements about CSAM users and CSAM in general. We adopted four questions from [Steel, Newman, O'Rourke, Quayle \(2022a\)](#), translated into Norwegian: "In your opinion, how many, in percentage 0-100 of those who view child abuse material; (1) have been sexually offended as a child; (2) have a pedophile preference (sexual interest in children); (3) will commit a contact sexual offence against children; (4) will commit a new online child sexual abuse offence after being convicted for this". The data from US was provided upon request.

In addition, we included the following statement, asking the respondents to rate to which extent they agreed/disagreed (5-point Likert-scale) to the statement "An online abuser differ from those who commit physical child abuse".

2.2. Support for treatment and imprisonment

A modified version of the statements used in [Steel, Newman, O'Rourke, Quayle \(2022a\)](#) were included to measure endorsement for treatment and imprisonment: Individuals that view CSAM(CP) are mentally ill and should get treatment, and Individuals that view CSAM(CP) should be imprisoned. The respondents were asked to indicate their agreement on a 7-point Likert scale ranging from strongly disagree to strongly agree.

2.2.1. Analysis

We used Pearson's r to examine the associations between the variables, independent sample t -tests to investigate gender differences and differences between this dataset and the data from [Steel, Newman, O'Rourke, Quayle \(2022a\)](#), and ANOVA to measure group differences between those with work that were not related, indirectly related or directly related to online child abuse. A paired sample t -test was used to test for differences in endorsement of imprisonment compared to treatment. We applied Cohen's d for effect sizes (d), where 0.20, 0.50 and 0.80 represent small, medium and large effect sizes respectively ([Cohen, 1992](#)). For post-hoc comparisons we applied Bonferroni corrections. As the variables consisted of single-item questions only, no imputation or replacement of missing were done, and analysis were performed on available valid observations only. We used a multiple, hierarchical regression analysis to analyze the associations between the demographic variables and perceptions of those who view CSAM with endorsement for imprisonment and treatment. There were no major breaches in the assumptions for the regression analysis; The assumptions for collinearity and independence were met, shown by VIF-values centered round 1 and 2, with no correlations between the variables above 0.8. The Durbin-Watson value for the model for treatment was 2.10, for the model for imprisonment it was 2.02, while the model for difference from physical abusers had a Durbin-Watson value of 1.95. The Kolmogorov-Smirnov tests illustrated that the assumption for normality was met.

3. Results

Table 1 presents the mean, standard deviation and the associations between the variables included in this study. Overall, 26.1 % agreed that persons who commit CSAM offences differ from contact child sexual offenders while 49 % of the respondents disagreed with this statement, and 34.9 % selected the response "Neutral" ($M = 2.63$, $SD = 1.11$). 79.3 % agreed with the statement "persons viewing sexualized pictures of children (child pornography) are mentally ill, and should receive treatment", 6.7 % disagreed and 14.0 % percent selected the response "neutral" ($M = 5.60$, $SD = 1.39$). 72.7 % agreed with the statement "persons viewing sexualized pictures of children (child pornography) should be imprisoned", 10 % disagreed, and 17.3 % selected neutral ($M = 5.49$, $SD = 1.45$). The mean difference (paired sample t -test) between endorsement for treatment and imprisonment was not significant; $t(597) = 1.41$, $p = .16$.

There was a strong association between perceptions of individuals that view CSAM having a pedophile preference and the perceived risk of future contact child sexual offences, persons viewing CSAM being sexually abused as children and endorsement for treatment. Contact abuse estimation was positively correlated to endorsement for imprisonment and estimated recidivism, and negatively correlated to perceptions of individuals committing CSAM offences as different from those committing contact child offences. There was a significant association between gender and endorsed imprisonment and treatment, where women endorsed both treatment and imprisonment more than men. Higher education was associated with a lower estimated percentage of contact offences. Older age was associated with a lower estimation of pedophilic preference for individuals committing CSAM offences and less agreement to the statement concerning differences between persons committing CSAM offences and contact child sexual offences (**Table 1**).

Working in areas involving CSAM was negatively associated with the estimated percentage of individuals committing CSAM offences having a pedophilic preference, committing a contact offence, and recidivism; and was also associated with lower endorsement of both treatment and imprisonment. An independent t -test was used to explore the significant gender differences in general perceptions of individuals that commit CSAM offences. Women estimated a significantly higher mean percentage of childhood victimization than men ($M = 46.47$, $SD = 21.52$). compared to men ($M = 38.44$; $SD = 23.49$), $t(560) = 3.66$, $p < .001$, $d = 0.37$. Further, women estimated a higher percentage of future contact abuse than men ($M = 41.66$, $SD = 23.38$ versus 30.20), $t(560) = 34.94$, $p < .001$, $d = 0.49$.

Table 2 presents the comparison between the results obtained in this current study to prior obtained data on public perceptions and empirical evidence. The respondents in the US ($M = 61.47$, $SD = 24.31$) estimated significantly higher values of what percentage of individuals that view CSAM offenders they believed were sexually abused as children compared to respondents in Norway ($M = 44.45$, $SD = 22.17$), $t(1093) = 12.13$, $p < .001$, and in the estimation of what percentage of CSAM offenders they believed will commit another CSAM abuse, $t(1084) = 9.92$, $p < .001$. The group differences represent medium effect sizes, $d = 0.73$ and 0.61 respectively.

Although the estimated percentages of pedophilic preference were significantly different in the US sample ($M = 78.56$, $SD = 24.06$)

Table 2

Perceptions of Individuals committing CSAM offences, compared to prior study and empirical evidence.

Percent of CSAM users	Current study ($n = 573$)	Steel et al. (2022) ($n = 524$)	d	Empirical evidence
Sexually abused as a child	44.45 ($SD = 22.17$)	61.47 ($SD = 24.31$)	0.73	11.7 ¹ 20.41 ² 26.0 ³
Recidivist	59.08 ($SD = 26.85$)	73.73 ($SD = 21.17$)	0.61	< 10% ^{1 4 5}
Pedophile preference	69.18 ($SD = 23.81$)	78.56 ($SD = 24.06$)	0.39	43.88 ²
Contact child sexual offenders	38.91 ($SD = 23.65$)	62.53 ($SD = 25.57$)	0.96	< 10 % ⁵

¹ Faust et al. (2015).

² Paquette et al. (2022).

³ Webb et al. (2007).

⁴ Babchishin et al. (2015).

⁵ Seto (2021).

compared to the estimated percentage in Norway ($M = 69.18$, $SD = 23.81$), $t(1092) = 6.48$, $p < .001$, the group difference represents a small effect, $d = 0.39$. Lastly, an unpaired t-test showed that the US sample ($M = 62.53$, $SD = 25.57$) estimated significantly higher values of what percentage of those who view CSAM they believed will commit contact abuse of children, compared to the Norwegian sample ($M = 38.91$, $SD = 23.65$), $t(1093) = 15.89$, $p < .001$. The group difference represents a large effect size, $d = 0.96$.

3.1. Group comparison

Table 3 presents the results from the one-way ANOVA comparing those who work directly, indirectly, or unrelated to online child sexual abuse. There were no significant differences between these groups on the estimation of what percentage of people who watch abuse material they believed have been sexually abused as children, $F(2,433) = 2.88$, $p = .06$.

The result of the one-way ANOVA analysis of the effect of whether people were working with the topic of CSAM offenders on their estimation of what percentage of people who watch abuse material they believed has a pedophile preference revealed a significant effect, $F(2, 431) = 8.71$, $p < .001$.

Post hoc comparisons showed that the mean score for not working with the topic ($M = 70.82$, $SD = 23.64$) was significantly different from the mean score for working indirectly with the topic ($M = 59.82$, $SD = 23.81$), and that the mean score for not working with the topic was significantly different from the mean score for working directly with the topic ($M = 58.13$, $SD = 27.95$). Working indirectly with the topic did not significantly differ from working directly with the topic.

The results also showed a significant effect of working with the topic or not on people's estimation of what percentage of those who watch abuse material they believed will commit physical abuse against children, $F(2, 433) = 5.59$, $p < .01$. The mean score for not working with the topic ($M = 40.61$, $SD = 24.24$) was significantly different from the mean score for working directly with the topic ($M = 28.66$, $SD = 20.36$). However, the group working indirectly with the topic ($M = 33.54$, $SD = 21.13$), did not significantly differ from working directly with the topic, or not working with the topic. Lastly, no significant effect of working with the topic or not was observed on people's estimation of recidivism percentage $F(2,431) = 2.85$, $p = .06$.

3.2. Regression analysis

Table 4 presents the result from the regression analyses with the variables "endorsement for treatment", "endorsement for imprisonment", and "Individuals that commit CSAM offences differ from contact child sexual offenders" as outcome. For all outcomes, demographic variables were weak predictors. Having children was a significant statistical predictor to endorsement of imprisonment, higher education was associated with less endorsement for treatment, and more agreement to the statement that CSAM offenders differ from other child sexual offenders. Gender was a significant predictor for perceiving individuals that commit CSAM offences as different from those committing contact child sexual abuse, while only in model 1 consisting solely of demographic variables. Working with the topic child sexual abuse material was the only significant predictor for perception of persons committing CSAM offences as different from those committing physical abuse (model 3). General perception of CSAM offenders, in terms of the estimated percentage of those who view CSAM committing future contact offences, was the strongest predictor of the outcomes. For endorsement of treatment, estimated percentage of childhood sexual victimization and pedophilic preference were significant predictors. For endorsement of imprisonment, risk of contact abuse, pedophilic preference and recidivism were significant predictors. For perceiving individual that commit CSAM offences as different from those committing contact sexual offenders, risk of contact abuse and recidivism were significant predictors.

4. Discussion

The aim of this study was to explore public perceptions of individuals that commit child sexual abuse (CSAM) offences. We explored associations between demographic variables, general perceptions and endorsement of imprisonment and treatment for individuals that commit CSAM offences. We compared results from this study to those obtained in the US. The results show that consistent with prior studies (e.g., Babchishin et al., 2015; Lam et al., 2010; Seto et al., 2011), the respondents overestimated the risk of contact abuse, recidivism, being victim of child abuse, and having a pedophile preference, supporting H1. H2 was only partially supported, as

Table 3
Means, Standard Deviations, and One-Way Analyses of Variance in perceptions of Individuals committing CSAM offences.*

Measure	Not working with CSAM-related topics ($n = 398$)		Working indirectly with CSAM related topics ($n = 63$)		Working directly with CSAM related topics ($n = 32$)		F	df	η^2
	M	SD	M	SD	M	SD			
Sexually abused as a child	45.91	22.41	45.75	21.44	36.00	19.87	2.88	2, 433	0.01
Pedophile preference	70.82	23.64	59.82	23.81	58.13	27.95	8.71***	2, 431	0.04
Contact offenders	40.61	24.24	33.54	21.13	28.66	20.36	5.59**	2, 433	0.03
Recidivist	61.22	26.88	53.94	25.88	53.53	27.04	2.85	2, 431	0.01

*** $p < .001$.

** $p < .01$.

* $p < .05$.

Table 4
Hierarchical regression analysis.

Variable	Treatment (n = 419)			Imprisonment (n = 411)			Different than physical abusers (n = 421)		
	95 % CI ^a	β	R ² (Adj.R ²)	95 % CI ^a	β	R ² (Adj.R ²)	95 % CI ^a	β	R ² (Adj.R ²)
Model 1			0.02 (0.01)			0.04 (0.03)**			0.03 (0.02)*
Gender	[-0.60, 0.04]	-0.09		[-0.61, 0.06]	-0.08		[0.03, 0.54]	0.11*	
Age	[-0.02, 0.01]	-0.04		[-0.03, 0.00]	-0.14		[-0.02, 0.01]	-0.03	
Education	[-0.34, -0.00]	-0.10*		[-0.34, 0.02]	-0.09		[0.01, 0.28]	0.11*	
Has children	[-0.27, 0.56]	0.05		[0.21, 1.07]	0.22**		[-0.54, 0.11]	-0.10	
Model 2			0.12 (0.10)***			0.16 (0.15)***			0.14 (0.12)***
Gender	[-0.44, 0.20]	-0.04		[-36, 0.29]	-0.01		[-0.14, 0.36]	0.04	
Age	[-0.01, 0.02]	0.01		[-0.02, 0.01]	-0.07		[-0.02, 0.00]	-0.09	
Education	[-0.31, 0.02]	-0.09		[-0.26, 0.08]	-0.05		[-0.04, 0.22]	0.06	
Has children	[-0.38, 0.42]	0.01		[-0.01, 0.82]	0.14		[-0.34, 0.29]	-0.01	
Sexually abused as child	[0.01, 0.02]	0.18***		[-0.00, 0.1]	0.07		[-0.01, 0.00]	-0.04	
Pedophile preference	[0.00, 0.02]	0.18***		[0.00, 0.01]	0.13**		[-0.01, 0.00]	-0.07	
Contact abuse	[-0.00, 0.01]	0.08		[0.01, 0.02]	0.20***		[-0.01, -0.00]	-0.18**	
Recidivism	[-0.01, 0.01]	-0.01		[0.00, 0.01]	0.11*		[-0.01, -0.00]	-0.17**	
Model 3			0.12 (0.10)***			0.16 (0.15)***			0.15 (0.13)***
Gender	[-0.44, 0.19]	-0.04		[-0.37, 0.28]	-0.01		[-0.16, 0.34]	0.03	
Age	[-0.01, 0.02]	0.02		[-0.02, 0.01]	-0.07		[-0.02, 0.01]	-0.09	
Education	[-0.30, 0.03]	-0.08		[-0.25, 0.09]	-0.05		[-0.02, 0.24]	0.08	
Has children	[-0.38, 0.43]	0.01		[0.01, 0.83]	0.15*		[-0.33, 0.29]	-0.01	
Sexually abused as child	[0.01, 0.02]	0.18***		[-0.00, 0.01]	0.07		[-0.01, 0.00]	-0.05	
Pedophile preference	[0.00, 0.02]	0.18**		[0.00, 0.01]	0.13*		[-0.01, 0.00]	-0.09	
Contact abuse	[-0.00, 0.01]	0.07		[0.01, 0.02]	0.20***		[-0.01, -0.00]	-0.19***	
Recidivism	[-0.01, 0.01]	-0.01		[0.00, 0.01]	0.11*		[-0.01, -0.00]	-0.17***	
Working with the topic	[-0.32, 0.12]	-0.04		[-0.36, 0.15]	-0.04		[-0.38, -0.03]	-0.11*	

* $p < .05$.

** $p < .01$.

*** $p < .001$.

^a 95 % confidence interval for unstandardized B.

demographic variables were of marginal importance. Women to a larger extent than men presented stereotypic views concerning childhood sexual victimization and risk of contact offences, resonating with studies on perceptions of individuals that commit sexual offences in general (Willis et al., 2013). Contradicting previous research (Harper et al., 2022) education was not associated with perceptions, except for estimated risk of contact child offences, where older individuals estimated the risk to be lower than younger ($r = -0.13$, $p < .05$). However, the lack of significant association to other misperceptions in this study might be attributed to the restricted range in the variable, as the dominant majority in this sample had university degrees.

Stigma associated with CSAM offences increases shame and self-loathing, increases risk and prevents help-seeking (Kothari et al., 2021; Wurtele, 2021). Addressing public perceptions, and the discrepancy between lay perceptions and empirical evidence can contribute to reduce stigma, and hence improve mental health seeking and thereby serve as a means for child abuse prevention (Harper, 2012). Empirical evidence suggests that CSAM offenders differ from contact child sexual offenders (Babchishin et al., 2015; Babchishin et al., 2018; Faust et al., 2015; Garrington et al., 2018; Henshaw et al., 2017; Lim et al., 2021). Our results, however, show

that 49 % of the sample disagree with the claim that online sexual offenders differ from contact sexual offenders. This can be related to the overestimation of the risk of CSAM offenders committing a contact offence, both in the US (Steel, Newman, O'Rourke, Quayle, 2022a) and Norway, as shown in this current study. However, when it comes to individuals that commit CSAM offences, research shows that they represent a very diverse group, committing a variety of offences (Finkelhor et al., 2023). Further, those who commit CSAM offences vary in both forensic and psychological profile (Elbert et al., 2022). Hence, one should be cautious when discussing the accuracy of the public perceptions of CSAM offenders in general as exact knowledge about this group is still limited.

4.1. Differences between the Norwegian and the US sample

There were considerable differences between the US and the Norwegian sample, especially concerning risk of contact offences and childhood sexual victimization. Hence, H3 was supported. There was a tendency to overestimate whether CSAM offenders were sexually abused as children, if they have a pedophilic preference, and the risk of both recidivism and committing a contact child sexual offence in both samples. However, this tendency was significantly different from the public's estimations in the US, with moderate to large effect sizes. The Norwegian sample estimated lower values on all these variables, compared to the US sample from Steel, Newman, O'Rourke, Quayle (2022a). The US sample (Steel, Newman, O'Rourke, Quayle, 2022a) reported higher endorsement of imprisonment compared to treatment, with only 32 % supporting treatment over imprisonment. In this study, however, we split the item used in Steel, Newman, O'Rourke, Quayle's (2022a) research, using them as two non-ipsative questions to analyze predictors for each outcome. Approximately 78 % agreed that individuals that commit CSAM offences are mentally ill, and should be treated, while approximately 71 % agree that CSAM offenders should be imprisoned. Even though these findings cannot be directly compared because of the different means of measurement applied, our findings did not indicate a leniency towards imprisonment treatment Norway ($p > .05$). Although limitations apply, the results suggest that there might be a cultural difference between the public's perceptions in Norway compared to the US in the endorsement of treatment and imprisonment of CSAM offenders.

There are many potential explanations for these differences, including distinctive characteristics of the sample. As media coverage of child abuse influence perceptions of sexual offenders (Harper & Hogue, 2017), difference in screen time and the nature of the portray of CSAM offenders in US and Norway can partly explain the differences. Steel, Newman, O'Rourke, Quayle (2022a) argues that the availability heuristic can provide understanding of how one recalls rare instances, which can lead to overestimating the probability of an event occurring. The news media have favored reporting extreme and atypical crimes, which also can contribute to the overestimation of events (O'Connell, 1999). Further, cross-cultural differences in criminal justice systems, and community responses to sex offenders (Petrunik & Deutschmann, 2008) are likely to be an important factor explaining the differences.

4.2. Exposure to persons who have committed sexual offences

As exposure to persons who have committed sexual offences is considered as the strongest influence of attitude towards sexual offenders (Harper et al., 2017), we hypothesized that those working with the topic would have less harsh perceptions of online child abusers (H4). Our results from the ANOVA analysis of group differences between those working directly with, indirectly with, or not working with the topic CSAM, also enlighten the perception of whether CSAM offenders are seen as different from contact offenders. The group not working with the topic estimated significantly higher values of CSAM offenders' risk of committing physical abuse against children, compared to those working directly with the topic. Regarding perception of CSAM offenders having a pedophile preference, those not working with the topic estimated significantly higher values, compared to those working both indirectly with and directly with the topic. These findings suggest that education related to, and experience with individuals that have committed CSAM offences, are associated with less stigmatizing, and more empirically founded, perceptions of the risk associated with contact abuse. This is consistent with previous research finding that prison personnel have less stereotypical attitudes towards sex offenders (Kjelsberg & Loos, 2008).

H5, postulating that demographic variables would predict endorsement for treatment, imprisonment and the perception of individuals committing CSAM offences as different than those committing contact child sexual abuse received only marginal support. Having children remained the sole significant predictor in the regression analysis, and this was the case only for the endorsement of imprisonment. Those working the topic of CSAM offending, a group consisting mainly of psychologists and police officers, was associated with lower levels of endorsement of both treatment and imprisonment, compared to those not working with the topic. However, working with the topic was not a statistically significant predictor of either endorsement of treatment or imprisonment in our regression analysis.

So, the hypothesis regarding work exposure was partially supported, i.e., for the general perception of CSAM offenders (H4), but not for endorsement of treatment (H6).

The findings that working with the topic (online child abuse) did not statistically predict endorsement for treatment contradict previous findings of professionals working in settings with child sexual offenders having stronger endorsement for treatment than other groups (Brown & Kloess, 2022). On that note, our findings can be described as surprising. It might be that this group to a larger extent are familiar with the UK study claiming they find treatment programs to be ineffective for CSAM offenders (Mews et al., 2017). Other research, however, has found treatment programs to be effective for CSAM offenders (Gannon et al., 2019). The lower endorsement of treatment among professionals in our study can perhaps be affected by stigmatizing perceptions of CSAM offenders. Iffland and Schmidt (2023) claim there still is considerable stigmatization of people with pedophilic interest and CSAM offending among professional experts. Our findings can also be supported by Harper (2012), who found that psychology students had no less stigmatizing perceptions of sex offenders compared to other students. It is important however, to highlight that the endorsement for

treatment of CSAM offenders for people working with the topic was still high. Further, the dispersion in the responses within the groups is substantial.

H7 postulated that the general perceptions of individuals would be significant predictors of endorsement of treatment and imprisonment, and the perception that individuals who commit CSAM offences are different than those who commit contact child sexual abuse. The perception of CSAM offenders being sexually abused as children and them having a pedophile preference were statistically significant predictors for support for treatment. Given the significance of childhood victimization when it comes to cognitions about children and child sexual interest (Chopin et al., 2022), it is a factor that deserves attention. Perceived pedophilic interest was also a statistically significant predictor for endorsement of imprisonment, along with having children, and the perception of CSAM offenders' risk of recidivism. However, the strongest predictor in the model was by far perceived risk of contact child sexual abuse. For perceiving individuals that commit CSAM offences as different than those who commit physical child sexual offences, the estimated risk of recidivism and, logically, the estimated risk of contact child sexual abuse were significant predictors. Together the results from the regression analyses suggest that specific perceptions are specifically associated with different outcomes.

4.3. How do we reduce stereotypical perception towards CSAM in the general population and why is it important?

The most easily endorsable argument for educating society on CSAM offenders and reducing stigma is that successful reintegration and stigma reduction may reduce risk of recidivism and contact offending (Steel, Newman, O'Rourke, Quayle, 2022a). Even though the estimation from the Norwegian sample, compared to the US sample, is closer to empirical evidence (Paquette et al., 2022; Babchishin et al., 2011, 2015; Steel et al., 2021), the difference is still striking. Specialized treatment for individuals that commit CSAM offences appears to be most effective (Låtth et al., 2022; Paquette et al., 2022). The public perceptions of those who commit CSAM offences as different than those who commit contact child sexual offences can spur the development of specialized, effective treatment programs that again can reduce these offences. The public's assumptions, and the stigmatization of CSAM offenders may have a substantial impact on the individual offenders, but also have consequences for their families and society (Jones et al., 2023; Kothari et al., 2021; Steel, Newman, O'Rourke, Quayle, 2022a). Stereotypical negative perceptions of CSAM offenders may contribute to further stigmatization of the group and lead to failures of reintegration of offenders to society (Harper & Hogue, 2015; O'Connell, 1999; Steel, Newman, O'Rourke, Quayle, 2022a). Research has also shown that psychoeducation is effective to inform people's attitudes towards sex offenders (Kleban & Jeglic, 2012; Wurtele, 2021), and Steel, Newman, O'Rourke, Quayle (2022a) argues this may also be of benefit of CSAM offences.

4.4. Limitations

The group working directly with child abuse was small, consisting mainly of individuals working as police and psychologists, which limits the generalizability of the findings. The dispersion in this group was relatively high, indicating a possibility for ingroup-variance to have affected the results. Caution should be made regarding interpretation the results for endorsement for treatment over imprisonment, as we did not apply a forced choice. The results could differ substantially if applying the same format used in the US study. Differences in sampling procedures and consequently, the representativeness of the two samples might have influenced the results stating the differences between the two samples regarding the general perceptions of individuals that commit CSAM offences. Compared to the US sample, women were overrepresented (76 % compared to 51 %), and the mean age was lower in the Norwegian sample than in the US sample. Hence, the results concerning cross-national differences should be interpreted with caution. Although some have found the prevalence of mental disorders among CSAM offenders to be high (Seiser et al., 2023), other studies indicate otherwise (Paquette et al., 2022). Professionals working with the topic are probably more aware of the diversity among persons committing CSAM, both in terms of offence (Finkelhor et al., 2023) and psychological profiles (Elbert et al., 2022). Hence, this group would have more accurate general perceptions about persons committing CSAM offences and be more reluctant to endorse both treatment because of mentally illness and imprisonment to protect against future contact offences. It might be that less endorsement for treatment reflects a perception of individuals that commit CSAM offences not being ill, rather being the "average Joe".

4.5. Summary and concluding remarks

In this study we observed that demographic variables were only marginally associated with general perceptions of individuals that commit CSAM offences and had no predictive value for endorsement for treatment. Women to a larger extent than men presented stereotypic views than men concerning childhood sexual victimization and risk of contact offences. For endorsement of imprisonment, having children was the only significant predictor among the demographic variables. Stronger perceptions of persons committing CSAM offences being sexually abused as children and having a pedophile preference predicted support for treatment. The perception of individuals who commit CSAM offences having a pedophilic preference, higher levels of estimation of risk of whether they would commit another CSAM offence and perceived likelihood to commit contact abuse against children predicted higher endorsement for imprisonment for individuals committing CSAM offences. Estimating lower levels of risk for contact abuse and recidivism predicted higher support for the claim that those who commit CSAM offences are different from those committing contact child sexual abuse.

Substantial differences were observed between these results and those obtained in the US data. Although limitations apply, these results suggest that cross-national differences in the perceptions of persons that commit CSAM offences are important to consider in future research. Working with the topic of online child sexual abuse was associated with general perceptions of persons who commit CSAM offences more aligned with empirical evidence but was not a significant predictor of endorsement of imprisonment nor

treatment. However, in the future, larger studies of various groups working directly or indirectly with CSAM should be included to enable comparison of perceptions between different groups of professionals. Further, the role of media portrayal of persons who commit CSAM offences and public perceptions should be explored from a cross-cultural perspective.

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Informed consent

Informed consent to participate and publish the results was obtained from all individuals included in the study.

Compliance with ethical standards

The study involves only anonymous responses and does not collect any health data or other sensitive data. The protocol and survey were evaluated by SIKT. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research guidelines (NESH) and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The institutional ethical board reviewed and approved the study.

CRedit authorship contribution statement

Eva Langvik: Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Tale R. Størdal:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation. **Chad M. Steel:** Writing – review & editing, Writing – original draft, Methodology, Data curation. **Lisbet F. Christiansen:** Writing – original draft, Data curation, Conceptualization. **Anne Iversen:** Writing – review & editing, Writing – original draft, Supervision, Data curation, Conceptualization.

Declaration of competing interest

The authors have no relevant financial or non-financial interests to disclose.

Data availability

The data used in this study is available upon request made to the corresponding author.

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