

Substance-related problems among adolescents in child welfare services: A comparison between individuals receiving in-home services and those in foster care



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ABSTRACT

Background and aims: The literature base on substance use among adolescents who receive interventions from child welfare services (CWS) in Nordic countries is limited. The purpose of this study was to investigate whether Norwegian adolescents in contact with CWS are at higher risk for substance-related problems (SRP) compared with the general adolescent population, and to what extent those in foster care (FC) differ from those receiving in-home services (IHS).

Methods: The data set comprise 9785 individuals aged 16–19 years who participated in the cross-sectional, population-based youth@hordaland-survey, of whom 141 (1.4%) received IHS from the CWS, while 155 (1.6%) lived in FC. The primary outcomes were indicators of self-reported SRP. Regression analyses were used to explore the association between IHS/FC and SRP with a reference group from the general population. Potential confounding variables included age, sex, ethnicity, and internalizing- and externalizing mental health problems.

Findings: Compared with the general population, adolescents receiving IHS had a robust and consistent increased odds of SRP across multiple indicators compared to the general population, even after adjustment for confounding variables (adjusted odds ratios [AORs] ranging from 1.81 to 3.04, all $p < 0.05$; adjusted mean difference = 1.49, $p < 0.01$). Adolescents living in FC had a higher total degree of SRP (AOR = 1.51, $p < 0.05$), as well as higher illicit drug use (AOR = 1.75, $p < 0.05$), compared with the general adolescent population. The IHS-group had higher total degree of SRP (OR = 2.08, $p < 0.01$) compared with the FC-group.

Conclusions: Adolescents receiving IHS and adolescents in FC had a significantly heightened risk for SRP, compared with the general population. The risk for SRP was higher among adolescents receiving IHS compared with those living in FC. These findings indicate that prevention efforts of SRP in CWS-populations during adolescence are needed.

1. Introduction

The use of alcohol and illicit drugs affects a large proportion of adolescents in Western countries and remain an important public health concern. Substance-related problems (SRP) refer to extensive use of such substances and are related to mental health problems (Heradstveit et al., 2018; Skogen et al., 2014), as well as a range of negative health outcomes (Schulte and Hser, 2013) and school-related problems (Heradstveit et al., 2017). The etiology of SRP is multifactorial and

likely involves a complex interplay between genetic, psychological and social risk- and protective factors (Newcomb and Felixortiz, 1992).

Individuals receiving interventions from child welfare services (CWS) are subject to increased risk of negative life experiences such as maltreatment and living with parents with SRP or mental illness (Ruffolo et al., 2003; Havnen et al., 2009; Lehmann et al., 2020). These risk indicators are also predictors of SRP (Shin et al., 2013). CWS-clients have high rates of mental health problems, something that is documented among those living at home with their biological parents

Abbreviations: SRP, substance-related problems; CWS, child welfare services; FC, foster care; IHS, in-home-services

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(Iversen et al., 2007) and among those that are looked after by local authorities, i.e. which lives in out-of-home-placements (Ford et al., 2007). Several recent publications have investigated SRP among adolescents receiving interventions from CWS (Aarons et al., 2008; Kobulsky, 2019; Pittenger et al., 2018; Braciszewski and Stout, 2012; Keller et al., 2010; Orton et al., 2009; Fettes et al., 2013) and have demonstrated high rates of SRP in this group. However, only a limited number of studies have compared SRP in this group with the general population, according to a literature review (Braciszewski and Stout, 2012).

Among existing population-based investigations, a US study on 11–14 year old adolescents demonstrated higher self-reported lifetime marijuana use, lifetime and current inhalant use, and lifetime and current other illicit drug use among adolescents in the CWS-sample compared with the general population (Fettes et al., 2013). However, there was no difference across these groups in terms of alcohol use. A US study of 13–18 year olds found that CWS-involved youth had relatively high rates of lifetime substance use disorders (19.2%) based on a clinical diagnostic interview (Aarons et al., 2001). Another population-based study reported that individuals aged 12–17 years of age involved with foster care (FC) were approximately five times more likely to receive a past year drug dependence diagnosis compared with the general population (Pilowsky and Wu, 2006). On the other hand, a literature review reported that rates of alcohol and marijuana use were similar among adolescents in FC compared to the general population, while there was some evidence that use of hard drugs were more common among youth in FC (Braciszewski and Stout, 2012). A recent population-based study found higher rates of self-reported simultaneous use of multiple substances (i.e., illicit drug use and alcohol) in adolescents in FC compared with the general population (Long et al., 2017).

An important question is whether risk of SRP differs across sub-groups of CWS-involved youth. Interventions from CWS include in-home services (IHS), when adolescents and their family receive support while the adolescent is still living in his/her original home, and out-of-home placements, including residential care/institutions, kinship care, and FC (Kojan and Lonne, 2012). Previous studies tend to show a particularly high substance use among CWS-involved youth in out-of-home-placements compared with CWS-involved youth living in their original homes (Kobulsky, 2019; Cheng and Lo, 2010; Snyder and Smith, 2015; Traube et al., 2012), and it is indicated that substance use may be similar across different placement types (Wall and Kohl, 2007). A population-based US study of 14 year old adolescents, reported a high risk for inhalant use among CWS-involved youths in out-of-home-placements (17.1%) compared with the general population (4.2%), while inhalant use was not significantly elevated among CWS-involved adolescents living at home (Kobulsky, 2019). A similar pattern was found in a study of 11–14 year old adolescents reported that past month use of hard drugs was significantly higher among those with out-of-home-placements (26.5%) compared with CWS-involved adolescents living at home (14.7%) (Traube et al., 2012).

However, it is unclear to what extent previous findings on SRP in the CWS are generalizable to contexts in which the CWS-system has different characteristics, as substance use may potentially differ across different CWS-contexts (Iversen et al., 2007; Christiansen and Anderssen, 2010; Kojan, 2011). It is suggested that CWS in Nordic countries are more oriented towards prevention, early intervention and support, than in many other Western countries where the services are more solely oriented towards child protection (Kojan and Lonne, 2012; Christiansen and Anderssen, 2010; Gilbert et al., 2011). In the Norwegian CWS-setting, nearly 3% of Norwegian children receive interventions each year (NNS, 2019). Thus, Norway have a relatively extensive reach of the CWS-interventions (Burns et al., 2017). Concerns about parenting skills, parent's mental health problems, and conflicts at home are the most common reasons for entry into the Norwegian CWS-system, in comparison to for example Australia where abuse and neglect is the major reason for CWS-involvement (Kojan and Lonne,

2012). In Norway, 16% of notifications to CWS is made by the parents themselves, which is approximately three times higher than in Australia (Kojan and Lonne, 2012). Public services such as schools, health and social service and police are mandated to report to child welfare service if they suspect a child is being maltreated. As in other Western countries, there is a strong political and ideological aim to prevent children from being taken into substitute care, and most of the service provision in the Norwegian CWS resolves around support of children and youth living in their biological families (Kojan and Lonne, 2012; Kristofersen et al., 2006; Skivenes et al., 2017). Thus, around 60% of all children in contact with Norwegian CWS receive support while living at home with his/her own parents (Seip et al., 2018).

The proportion of children placed in out-of-home care in Norway was estimated to be around 1% in 2012/2013, which is comparable to other Nordic countries, but approximately twice as common as in the US (Burns et al., 2017). FC is by far the most common out-of-home placement in Norway, and according to national statistics, nearly 8 out of 10 of children in out-of-home-care live in FC (Seip et al., 2018; Dyrhaug and Sky, 2012). Out-of-home care is reserved for cases in which it is evaluated as unsafe or damaging for the child or youth to still live in their original home. Therefore, it is likely that adolescents in FC have a more severe history of abuse or neglect compared with adolescents receiving IHS.

In sum, the rates of CWS-involvement are higher in the Nordic settings compared with in many other Western countries, but the literature on SRP in this context is limited or non-existent. Thus, there is a general need for population-based studies on SRP among adolescents receiving interventions from CWS in a Nordic context. The aim of the present, population-based study of Norwegian adolescents was to investigate the risk of SRP among adolescents receiving interventions from CWS compared with the general population. This study is the first Norwegian population-based investigation on SRP that distinguishes between those living in FC and adolescents receiving IHS.

2. Material and methods

2.1. Study population and procedure

The sample comprised participants from the cross-sectional population-based youth@hordaland study (carried out during spring 2012). All adolescents born between 1993 and 1995 (aged 16 to 19 years) living in Hordaland county in western Norway were invited to participate ($n = 19,430$), and out of these, 10,257 adolescents participated (53%). The questionnaire was web-based, and one school hour was allocated to complete the questionnaire. The adolescents who did not attend school received the invitation by mail at their home address, while mental health services and other institutions were contacted to let adolescents from these settings participate as well. All participants gave their informed consent prior to inclusion in the study. After omitting participants with missing information on the CWS-contact variable ($n = 472$), the final number of participants was 9785. The Regional Committee for Medical and Health Research Ethics in Western Norway approved the study.

2.2. Child welfare services (CWS)

In the present study, the independent variable was CWS-status, in which three sub-groups were constructed: The foster care (FC)-group; the in-home services (IHS)-group; and the general population. (i) *FC-group*: Three variables were used to determine whether the individuals lived in FC. These variables asked whether the subjects currently lived with foster parents (Yes, $n = 82$); whether they currently lived with foster mother (Yes, $n = 106$); and whether they currently lived with foster father (Yes, $n = 113$). In total, 155 adolescents (1.6%) had a positive answer on any of these three variables, and they were included in the final FC variable. (ii) *IHS-group*: 198 individuals (2.0% of the

total sample) indicated that they have had contact with CWS during the past year. 57 of these individuals reported that they were living in FC and were not included in this variable. Thus, 141 adolescents (1.4%) were included in the final IHS-variable. (iii) *The general population*: The rest of the adolescents ($n = 9489$, 97.0%) comprised the general adolescent population.

2.3. Substance-related problems (SRP)

Several self-report variables were used to measure single indicators of substance use and problems. The validity of adolescent self-reported substance use is generally well supported (Winters et al., 1990). (i) A single item “Have you ever tried hash, marijuana or other narcotic substances?” was used to measure whether the individuals have *tried illicit drugs*. (ii) Several items measuring self-reported amounts of beer, cider, wine, spirits, and illegally distilled spirits usually consumed during a 14 days period were added up to a continuous variable of *total alcohol consumption*. *High-level alcohol consumption* was defined as scoring above the 90th sex-specific percentile. Only individuals with any present alcohol consumption was included in this variable (Heradstveit et al., 2017). (iii) One item asked: “Have you ever consumed so much alcohol that you were clearly intoxicated (drunk)?” This item had five categories ranging from “No, never” to “Yes, more than 10 times”. *Frequent alcohol intoxication* was defined as drinking so much that one was clearly intoxicated more than 10 times. (iv) Potential alcohol- and drug-related problems were measured using the six-item, validated CRAFFT scale. This scale has been designed to identify possible alcohol- and drug-related problems among adolescents and has been demonstrated to have acceptable sensitivity and specificity at a cut-off of ≥ 2 (Dhalla and Zumbo, 2011; Skogen et al., 2013). A dichotomous variable was calculated, separating those above the cut-off of ≥ 2 on CRAFFT from those below the cut-off. The reliability of this scale in our sample has previously been shown to be acceptable, with an McDonalds’ omega internal consistency coefficient at 0.88 in the youth@hordaland-sample (Heradstveit et al., 2019). The modeling of multiple substances rather than a single substance in isolation is recommended in CWS-populations (Traube et al., 2016). Therefore, we also constructed a compound measure of (v) the total degree of SRP (Heradstveit et al., 2017). Specifically, in this variable we summed up the number of positive scores on the following dichotomous variables: frequent alcohol intoxication (0/1), high-level alcohol consumption (0/1), a positive CRAFFT score (0/1), and having tried illicit drugs (0/1). Thus, this variable ranged from 0 to 4. See Fig. 1 for details.

2.4. Other variables

2.4.1. Demographic information

Age and sex were retrieved from the personal identification number from the Norwegian Population Registry and were available for all participants in the youth@hordaland sample. Three single items measured ethnicity, specifying whether the adolescents and their parents were born in Norway versus another country. SES was measured with three variables, including perceived economic well-being, maternal education, and paternal education, in accordance with previous publications (e.g. Heradstveit et al., 2019), and were used only in descriptive statistics. See Table 1 for details.

2.4.2. Mental health problems

Mental health problems were defined by the adolescents self-reported scores on the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997). An externalizing problems scale was constructed by summing the subscales of conduct problems and hyperactivity/inattention problems, while an internalizing problems scale was constructed by summing the subscales of emotional problems and peer/relationship problems (Heradstveit et al., 2018). The continuous *externalizing problems* variable ranged from 0 to 18 ($M = 5.39$,

$SD = 3.04$), and the *internalizing problems* variable ranged from 0 to 19 ($M = 4.82$, $SD = 3.32$).

2.5. Statistical analysis

The following statistical analyses were conducted: First, the sample was described by sociodemographic variables, comparing the IHS- and FC-groups with the general adolescent population (Table 1). Second, logistic and linear regression analyses were used to estimate the association between IHS- and FC-status and several single measures of SRP with the general population as the reference group (Table 2). These regression analyses were performed in three steps: (i) crude models investigating the univariate associations between IHS/FC and substance use; (ii) adjusted models that included age, sex, ethnicity, and internalizing mental health problems; (iii) and fully adjusted models that also included externalizing mental health problems. Third, ordered logistic regression analyses were used to estimate associations between IHS- and FC-status and the total degree of risky substance use, compared with the general population (Table 3). This analysis was performed in six steps: (i) unadjusted; (ii) sex; (iii) sex and age; (iv) sex, age, and ethnicity; (v) sex, age, ethnicity, and internalizing problems; and (vi) sex, age, ethnicity, internalizing problems, and externalizing problems. In addition, we calculated the unadjusted rates of the total degree of risky substance use across the general population, IHS-, and FC-status (Fig. 1). All analyses were performed using Stata/SE 15.1.

2.6. Representativity of the sample

While the quality of the youth@hordaland-sample is generally sound, the sample may not be fully representative for the youth population due to the response rate at 53%. Whereas official statistics show that 92% of the adolescents attend upper secondary school, the corresponding number in our sample is 98% (Skogen et al., 2014). Hordaland county is located on the West-coast of Norway and comprise both rural and urban areas (Bergen, the second largest city in Norway is located here). It is considered to be representative of Norway when it comes to sociodemographic composition (NNS, 2013). In 2014 a total of 0.74% of children/adolescents in Norway were formally under the care of CWS (spanning from 0.54 to 1.29% across different counties), while the corresponding number in Hordaland was 0.72% (NNS, 2019). Thus, Hordaland appear to be representative of Norwegian youths in terms of CWS characteristics. The official national statistics estimate that around 3% of children/adolescents in Norway receive CWS-interventions each year (NNS, 2019). This is similar to the size of the CWS-group in our sample at 3.0%, indicating that the sample is fairly representative of the CWS-population. However, according to recent statistics, around 60% of children/adolescents in the CWS received services while living at home (Seip et al., 2018), while our sample reported a fairly even proportion of adolescents in FC compared with those receiving IHS. In addition, the IHS-sample in the present study (67%) comprised more girls than what is expected from national statistics, in which boys are slightly more common to have had contact with the CWS (NNS, 2019).

3. Results

The IHS-group was significantly different from the general population on all demographic measures (p -values ≤ 0.001), including lower SES and higher rates of non-Norwegian ethnicity (Table 1). In addition, the IHS-group consisted of more girls (67.4%, $p = 0.001$), while the FC-group had somewhat fewer girls (45.2%, $p < 0.05$), compared with the general population. The FC-group had lower maternal education ($p < 0.01$) and higher rates of non-Norwegian ethnicity ($p < 0.001$).

The IHS-group had a higher risk for SRP across all dichotomous measures (adjusted odds ratios [AORs] ranging from 1.81 to 3.04, all $p < 0.05$), as well as a higher score on the continuous alcohol consumption measure (adjusted mean difference = 1.49, $p < 0.01$)

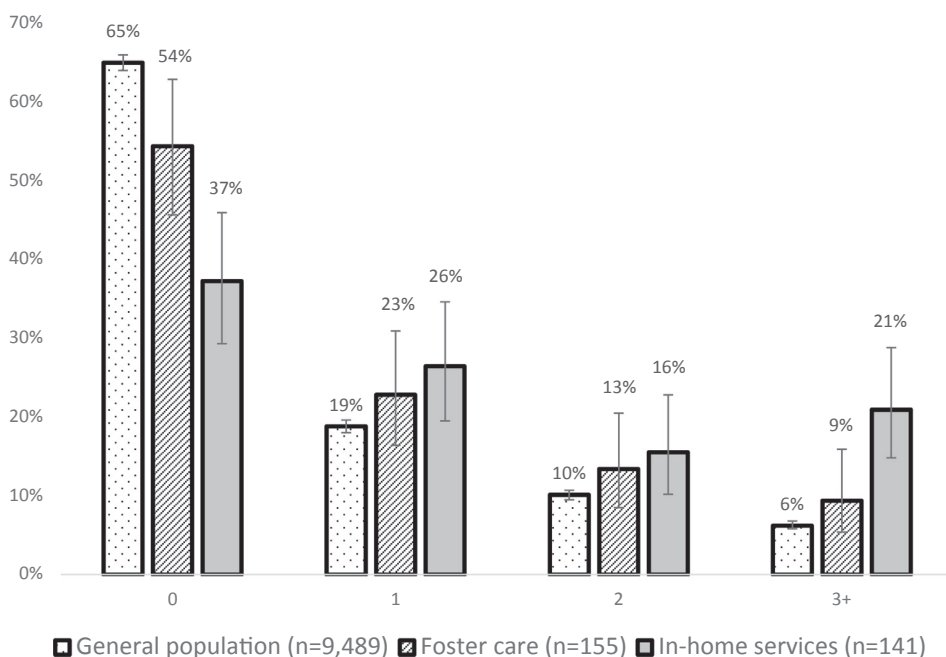


Fig. 1. Number of indicators of the total degree of SRP across general population, FC- and IHS-status (n = 9785). Notes: The total degree of SRP (substance-related problems) refers to number of positive scores (ranging from 0 to 4) on the following dichotomous variables: Frequent alcohol intoxication, high-level alcohol consumption, positive CRAFFT score, and having tried illicit drugs. FC = foster care. IHS = in-home services. Error bars represent 95% confidence intervals of the unadjusted rates for different levels of indicators of the total degree of SRP across groups.

(Table 2). The FC-group was similar to the general population in unadjusted analyses, except for more illicit drug use (OR = 2.14, p < 0.001) and a higher odds ratio for a positive CRAFFT score (OR = 1.52, p < 0.05). After adjustments for sex, age, ethnicity, internalizing problems, and externalizing problems, FC-status was only associated with illicit drug use (AOR = 1.75, p < 0.05).

As shown in Fig. 1, the IHS-group displayed a higher number of indicators of the total degree of SRP compared with the general population and with the FC-group. Whereas 21% of the IHS-group reported three or more indicators on the total degree of SRP, the corresponding rate was 9% in the FC-group and 6% in the general adolescent

population.

Using likelihood-ratio tests of proportionality of odds across response categories, the results indicated a non-significant difference (p = 0.09) between IHS-/FC-status and each level of indicators for the total degree of SRP. This finding suggests that the proportional odds assumption underlying the ordered logistic regression model was met (Fugleberg et al., 2018). We found a strong association between IHS-status and the total degree of SRP in both the unadjusted model (OR = 3.23, p < 0.001) and in the fully adjusted model (AOR = 2.31, p < 0.001) (Table 3). Similarly, a significant – although weaker – association was found between FC-status and the total degree of SRP

Table 1
Descriptive characteristics of the sample (n = 9785).

	General population (n = 9489)		Received CWS-interventions			
			HIS (n = 141)	p-value ¹	FC (n = 155)	p-value ¹
Sex: Girls, n (%)	5051 (53.2)	Ref.	95 (67.4)	0.001	70 (45.2)	0.046
Age, mean (SD)	17.43 (0.84)	Ref.	17.20 (0.77)	0.001	17.24 (0.78)	0.006
Perceived economic well-being, n (%)		Ref.		< 0.001		0.123
- Poorer than others	630 (6.8)		39 (28.9)		16 (11.3)	
- As most others	6292 (67.6)		69 (51.1)		91 (64.1)	
- Better than others	2382 (25.6)		27 (20.0)		33 (24.7)	
Maternal education, n (%)		Ref.		< 0.001		0.004
- Primary school	716 (10.0)		29 (31.2)		18 (19.0)	
- High school	2954 (41.1)		38 (40.9)		41 (43.2)	
- College / university	3513 (48.9)		26 (28.0)		36 (37.9)	
Paternal education, n (%)		Ref.		< 0.001		0.062
- Primary school	736 (10.5)		19 (24.4)		12 (13.8)	
- High school	3262 (46.4)		42 (53.9)		46 (52.9)	
- College / university	3039 (43.2)		17 (21.8)		29 (33.3)	
Ethnicity, n (%)						
- Self: From Norway	8900 (94.9)	Ref.	116 (85.3)	< 0.001	109 (74.7)	< 0.001
- Mother: From Norway	8683 (91.6)	Ref.	116 (82.3)	< 0.001	109 (71.2)	< 0.001
- Father: From Norway	8532 (90.3)		110 (78.0)	< 0.001	109 (71.9)	< 0.001
SRP, n (%)						
- Tried illicit drugs	929 (9.9)	Ref.	39 (27.7)	< 0.001	29 (19.0)	< 0.001
- High-level alcohol consumption	512 (5.8)	Ref.	26 (20.0)	< 0.001	11 (8.5)	0.197
- Frequent alcohol intoxication	1857 (19.6)	Ref.	43 (30.5)	0.001	29 (18.7)	0.789
- Positive CRAFFT score	1956 (20.8)	Ref.	58 (41.4)	< 0.001	43 (28.5)	0.022

Note: SD = standard deviation. CWS = child welfare services. IHS = in-home services. FC = foster care. SRP = substance-related problems. CRAFFT = acronym for screening instrument for alcohol/drug-related problems.

¹ Bold font denotes statistically significant differences, compared with general population (reference).

Table 2
Regression analyses for associations between IHS- and FC-status and single measures of SRP (n = 9785).

	Received CWS-interventions			
	IHS (n = 141)	p-value ¹	FC (n = 155)	p-value ¹
Ever used illicit drugs				
- Unadjusted, OR (95% CI)	3.49 (2.40, 5.08)	< 0.001	2.14 (1.42, 3.22)	< 0.001
- Partially adjusted, OR (95% CI) ²	3.44 (2.31, 5.11)	< 0.001	2.10 (1.36, 3.23)	0.001
- Fully adjusted, AOR (95% CI) ³	2.97 (1.70, 5.17)	< 0.001	1.75 (1.13, 2.72)	0.013
Frequent alcohol intoxication				
- Unadjusted, OR (95% CI)	1.80 (1.26, 2.59)	0.001	0.95 (0.63, 2.59)	0.789
- Partially adjusted, OR (95% CI) ²	2.66 (1.80, 3.94)	< 0.001	1.38 (0.89, 2.13)	0.144
- Fully adjusted, AOR (95% CI) ³	1.97 (1.31, 2.95)	0.001	1.12 (0.72, 1.75)	0.618
Positive CRAFFT score				
- Unadjusted, OR (95% CI)	2.69 (1.92, 3.78)	< 0.001	1.52 (1.06, 2.16)	0.023
- Partially adjusted, OR (95% CI) ²	2.52 (1.76, 3.60)	< 0.001	1.74 (1.20, 2.53)	0.004
- Fully adjusted, AOR (95% CI) ³	1.81 (1.24, 2.63)	0.014	1.42 (0.96, 2.10)	0.076
Alcohol consumption				
- Unadjusted, mean difference (95% CI)	1.69 (1.17, 2.22)	< 0.001	0.39 (-0.13, 0.90)	0.141
- Partially adjusted, adj mean diff (95% CI) ²	2.00 (1.50, 2.52)	< 0.001	0.65 (0.13, 1.17)	0.015
- Fully adjusted, adj mean diff (95% CI) ³	1.49 (0.98, 2.01)	0.004	0.41 (-0.09, 0.92)	0.111

Note: SRP = substance-related problems. OR = odds ratio. AOR = adjusted odds ratio. CI = confidence interval. SE = standard error. Adj mean diff = Adjusted mean difference. IHS = in-home services. FC = foster care.

Bold fonts denote statistically significant associations.

¹ Reference level: General population (n = 9489).

² Adjusted for age, sex, ethnicity, and internalizing problems.

³ Adjusted for age, sex, ethnicity, internalizing problems and externalizing problems.

Table 3
Ordered logistic regression analyses for associations between IHS- and FC-status and the total degree of SRP (n = 9,785).

	Received CWS-interventions			
	IHS(n = 141)	p-value ¹	FC(n = 155)	p-value ¹
Unadjusted, OR (95% CI)	3.23 (2.35, 4.45)	< 0.001	1.56 (1.11, 2.17)	0.010
Adjusted for sex, AOR (95% CI)	3.22 (2.34, 4.43)	< 0.001	1.56 (1.11, 2.18)	0.010
(+) adjusted for age, AOR (95% CI)	3.54 (2.56, 4.89)	< 0.001	1.72 (1.22, 2.43)	0.002
(+) adjusted for ethnicity, AOR (95% CI)	3.89 (2.80, 5.40)	< 0.001	1.92 (1.35, 2.73)	< 0.001
(+) adjusted for internalizing problems, AOR (95% CI)	3.55 (2.55, 4.94)	< 0.001	1.89 (1.32, 2.69)	< 0.001
(+) adjusted for externalizing problems, AOR (95% CI)	2.31 (1.72, 3.38)	< 0.001	1.51 (1.05, 2.18)	0.027

Note: IHS = in-home services. FC = foster care. SRP = substance-related problems. OR = odds ratio. AOR = adjusted odds ratio. CI = confidence interval.

Bold fonts denote statistically significant associations.

¹ Reference level: General population (n = 9,489).

(AOR = 1.51, p < 0.05). Of note, the IHS-group had significantly higher odds of SRP compared with the FC-group in unadjusted analyses (OR = 2.08, [95%CI: 1.31, 3.29], p = 0.002) (not shown).

4. Discussion

The present study indicates that adolescents in the Norwegian CWS have a significantly heightened risk for SRP. Although the risk was somewhat higher in adolescents living in FC compared with the general population, the highest risk for SRP was among the adolescents receiving IHS.

Specifically, this study found that adolescents receiving IHS had higher odds for all single measures of SRP and for the total degree of SRP compared to the general population. These associations were robust and consistent, and remained after adjustments of age, sex, ethnicity, internalizing- and externalizing mental health problems. In this respect, our results are consistent with prior research that has demonstrated higher rates of substance use among adolescents in the CWS (Aarons et al., 2008; Fettes et al., 2013; Traube, James, Zhang, & Landsverk, 2012). Thus, our findings demonstrate that youth in the CWS living at home (i.e., receiving IHS) constitute a high-risk group for adolescent SRP, over and beyond those living in FC, in a Norwegian setting.

These findings contradict previous studies that have reported that

out-of-home care is associated with somewhat higher substance use compared with CWS-involved youth living in their original home (Cheng and Lo, 2010; Snyder and Smith, 2015; Traube et al., 2012). However, these previous studies may not necessarily be generalizable to countries where the CWS-system has other characteristics. In the Nordic countries, CWS has been referred to as a “child and family oriented” service with a strong focus on support, prevention, equality of opportunities, and early intervention to vulnerable families (Kojan, 2011; Healy and Oltedal, 2010), and the majority of children/adolescents in contact with CWS receive services while living at home (Kojan, 2011). Several authors have pointed out that the Norwegian CWS thus differs from many other Western countries in which protection and safety are core principles (Christiansen and Anderssen, 2010; Kojan, 2011), and in which the CWS is frequently referred to as “child protection oriented”. Correspondingly, the total rate of children/adolescents in contact with CWS is higher in Norway compared with many other Western countries (Burns et al., 2017). This might imply that the Norwegian CWS is in contact with groups of children/adolescents that may not be in contact with the CWS elsewhere. A possible explanation for our findings of a particularly high risk of SRP in the IHS-group may be that these adolescents have been referred to CWS due to worries related to behavioural problems, in which substance use may be a part of the presenting problem. However, conditions at home is the main reason for CWS-contact in Norway, and youth’ conduct problem are only reported

as the reason for CWS-interventions in 15% of the cases (Kojan and Lonne, 2012). An alternative explanation may be that those living in FC have established a supportive family environment, in which foster parents have been through thorough selection and supervision from the CWS-system over time, while adolescents in IHS live in more turbulent and non-resolved family conditions. A disruptive family environment is a known risk factor for SRP among adolescents (Whitesell et al., 2013). However, these are mere speculations as we do not have data on referral reason, or the extent to which the adolescents actually have experienced neglect, abuse or other conditions that indicate family dysfunction. Therefore, we advise that our findings are interpreted with caution, and we recommend future studies to confirm and further explore the mechanisms behind the high substance use among CWS-involved adolescents living at home in a Nordic setting.

Adolescents living in FC were similar to the general population on several of the single measures of SRP, particularly in fully adjusted analyses. The FC-group had, however, a tendency toward both higher risk for positive CRAFFT-scores and alcohol consumption, while the large confidence intervals due to the relatively low subsample size make these estimates uncertain. Thus, these results should be interpreted with caution. However, the FC-group had a robust higher risk for illicit drug use. This finding lends support to a study that reported similar rates of alcohol use – but higher rates of illicit drug use – among US adolescents aged 15–18 years living in FC, than what is expected in the general population (Thompson and Auslander, 2007). Adolescents living in FC also had somewhat higher odds than the general population on a compound measure of SRP in the present study. This finding adds some support to studies that point to higher odds for particularly risky substance use measures among adolescents living in FC, such as simultaneous use of multiple substances (Long et al., 2017) and substance use disorders (Narendorf and McMillen, 2010). As noted by Pilowsky et al (Pilowsky and Wu, 2006), living in FC should be interpreted as a potential marker – not necessarily a cause – of the high risk for psychopathology and SRP, as individuals in FC display a range of prior adversities that are not directly related to FC. Importantly, adolescents in FC are likely to have experienced more serious neglect and abuse (i.e., prior to the placement in FC) compared with those receiving IHS. Thus, living in FC could be understood as a measure that potentially alleviates some of these adversities (Von Borczyskowski et al., 2013), for example by providing a secure environment and new, long-lasting family bonds (Christiansen et al., 2013), and specific comparisons of substance use in FC compared with the general population and other adolescents in CWS are needed.

Higher rates of mental health problems are present among youth receiving interventions from the CWS, whether they are living in FC or home with their original families, while youth living in institutions/residential care appear to have the highest rates of psychopathology (Ford et al., 2007). Adolescents receiving CWS-interventions have particularly high levels of externalizing mental health problems compared with the general population (Ford et al., 2007). Externalizing problems may be a marker of adversity such as childhood maltreatment (Cicchetti and Manly, 2001), and conduct-related problems (including severe substance use) is also among the presenting reasons for contact with the CWS-system (Kojan, 2011). Therefore, it is important to consider externalizing mental health problems when assessing the risk for substance use among youth in the CWS. In the present study, externalizing problems was the factor that contributed most to attenuate the association between CWS-involvement and SRP, while the adjustment for sociodemographic variables and internalizing mental health problems did not consistently reduce the magnitude of the association. This finding lends some support to previous publications that point to externalizing problems as strong correlates of SRP in both the general youth population (Heradstveit et al., 2018), and among adolescents in the CWS (Fettes et al., 2013; Traube et al., 2012; Wall and Kohl, 2007). Other variables may also affect the association between CWS-contact and SRP among adolescents, such as late entry into CWS and multiple

placements (Aarons et al., 2008). However, we did not have available data to explore the influence of such factors.

As expected, the sociodemographic characteristics – including SES and ethnicity – were significantly different in the IHS-group compared with the general population. These findings support a previous study by Iversen et al (Iversen et al., 2007), which reported low income, education, and poor mental health among individuals in the CWS. Similarly, low parental education and income, as well as non-Western ethnic origin, were associated with CWS-involvement in another Norwegian study (Staer, 2016). Adolescents living in FC also reported lower maternal educational level and higher levels of non-Norwegian ethnic origin on the part of themselves and their parents. Thus, our findings indicate that adolescents with a non-Norwegian ethnicity are over-represented in the Norwegian CWS-system in general, as well as in FC-placements specifically. This conclusion is in accordance with national statistics from 2012, which indicated that a relatively high proportion of adolescents placed in FC had non-Norwegian ethnicity (Dyrhaug and Sky, 2012).

5. Strengths and limitations

A main strength of the present study was the large population-based sample of adolescents, which enabled a detailed investigation of main effects between CWS-status, SRP, and other relevant co-variables. The distinction between IHS- and FC-status adds as strengths. Also, the use of multiple indicators of SRP – including both alcohol use and illicit drug use – is important (Traube et al., 2016). Approximately 3% of children/adolescents in Norway receive CWS-interventions each year (NNS, 2019), mimicking the numbers in the present study, and supporting the validity of our sample.

The study also has some limitations. First, it was based on self-reported data on IHS- and FC-status, and access to registry-based information of lifetime and current CWS-use would have added strength to this study. Self-reported data on health service use is generally of variable accuracy (Bhandari and Wagner, 2006). However, the validity of self-reported CWS-use is not known, and there is a need for studies to evaluate this issue. The relatively high rate of adolescents with non-Norwegian ethnicity in our CWS-sample is consistent with official statistics (Dyrhaug and Sky, 2012), which to some degree validate the variable. Second, as our dataset lacked a historical record of previous contact with the CWS, IHS-status was defined for those who have had contact with the CWS in the past year. A limitation of the present study is therefore that we did not identify those who have terminated their contact with CWS earlier. Third, the IHS-group included more girls than expected from general statistics (NNS, 2019; Christiansen, 2015). This may suggest that boys were inclined to underreport CWS-involvement in our data. However, as substance use is relatively similar across the sexes in the youth@hordaland-sample (Heradstveit et al., 2017), it is unlikely that this potential underreporting has seriously biased our findings. In addition, attrition from the study could affect generalizability, with a response rate of about 53% and with adolescents in schools somewhat overrepresented. It is likely that a somewhat higher number of adolescents among those not attending school may have CWS-contact. Thus, we may have underestimated the true extent of CWS-contact in our population, potentially resulting in an underestimation of the strength of association between CWS-involvement and SRP. However, regression models are suggested to be more robust to selective participation than prevalence estimates (Wolke et al., 2009). Fourth, the cross-sectional design of the study is a limitation, along with the lack of historical data on CWS-use and age-of-onset for substance use. Thus, the temporal order of SRP and CWS-contact cannot be established, and longitudinal investigations are needed to replicate and elaborate on the findings. Fifth, we did not have data on other risk factors for adolescent substance use, such as trauma-history of the adolescents or substance abuse among biological parents. There is a high rate of substance abuse among biological parents of children in the

CWS-population and this may impact the offspring for example through genetic factors (Von Borczyskowski et al., 2013), something which is not investigated in the present study. Finally, although the total sample size was large, the CWS-subsamples was relatively small. We therefore only performed an unadjusted comparison between the two CWS-groups on the total degree of SRP variable. We acknowledge that the small sample sizes in these two groups induces uncertainty in the presented estimates, and that the findings from the present study need to be corroborated in larger scale studies.

6. Conclusion

Adolescents in contact with the CWS-system, including both individuals receiving IHS and those living in FC, had a heightened risk for SRP compared with the general population. This risk only partly attenuated after the adjustment for externalizing problems. Adolescents receiving IHS had consistently the highest risk for SRP, and thus constitute a particularly important high-risk group in need of interventions to reduce current and future risk of SRP.

CRedit authorship contribution statement

Ove Heradstveit: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Writing - review & editing. **Nathalie Gjertsen:** Conceptualization, Formal analysis, Writing - original draft. **Anette Christine Iversen:** Conceptualization, Formal analysis, Writing - review & editing. **Sondre Aasen Nilssen:** Methodology, Writing - review & editing. **Kristin Gärtner Askeland:** Methodology, Writing - review & editing. **Øivin Christiansen:** Conceptualization, Writing - review & editing, Conceptualization, Writing - review & editing. **Mari Hysing:** Conceptualization, Writing - review & editing.

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References

- Aarons, G. A., Brown, S. A., Hough, R. L., Garland, A. F., & Wood, P. A. (2001). Prevalence of adolescent substance use disorders across five sectors of care. *Journal of the American Academy of Child & Adolescent Psychiatry*, 40(4), 419–426.
- Aarons, G. A., Hazen, A. L., Leslie, L. K., Hough, R. L., Monn, A. R., Connelly, C. D., et al. (2008). Substance involvement among youths in child welfare: The role of common and unique risk factors. *American Journal of Orthopsychiatry*, 78(3), 340–349.
- Bhandari, A., & Wagner, T. (2006). Self-reported utilization of health care services: Improving measurement and accuracy. *Medical Care Research and Review*, 63(2), 217–235.
- Braciszewski, J. M., & Stout, R. L. (2012). Substance use among current and former foster youth: A systematic review. *Children and Youth Services Review*, 34(12), 2337–2344.
- Burns, K., Pösö, T., & Skivenes, M. (2017). Child welfare removals by the state: A cross-country analysis of decision-making systems. In K. Burns, T. Pösö, & M. Skivenes (Eds.), *Removals of children by the child welfare system—variations and differences across countries* (pp. 223–243). NY: Oxford University Press.
- Cheng, T. C., & Lo, C. C. (2010). Drug use among maltreated adolescents receiving child welfare services. *Children and Youth Services Review*, 32(12), 1735–1739.
- Christiansen, Ø., & Anderssen, N. (2010). From concerned to convinced: Reaching decisions about out-of-home care in Norwegian Child Welfare Services. *Child & Family Social Work*, 15(1), 31–40.
- Christiansen, Ø., Havnen, K. J., Havik, T., & Anderssen, N. (2013). Cautious belonging: Relationships in long-term foster-care. *British Journal of Social Work*, 43(4), 720–738.
- Christiansen Ø. Hjelpetiltak i barnevernet - en kunnskapsstatus [Supportive measures in

- the child welfare services - a status of the current knowledge]: Regional Centre for Child and Youth Mental Health and Child Welfare (RKBV Vest), Uni Research; 2015 [Available from: http://kriminalitetsforebygging.no/wp-content/uploads/2017/11/Kunnskapsstatus_Hjelpetiltak_i_barnevernet.pdf].
- Cicchetti, D., & Manly, J. T. (2001). Operationalizing child maltreatment: Developmental processes and outcomes. *Development and Psychopathology*, 13(4), 755–757.
- Dhalla, S., D Zumbo, B., Poole, G. (2011). A review of the psychometric properties of the CRAFFT instrument: 1999-2010. *Current Drug Abuse Reviews* 4(1):57–64.
- Dyrhaug T, Sky V. Barn og unge med innvandrerbakgrunn i barnevernet 2012 [Children and adolescents with immigrant background in the child welfare services 2012]: SSB; 2015 [Available from: https://www.ssb.no/sosiale-forhold-og-kriminalitet/artikler-og-publikasjoner/_attachment/222464].
- Fettes, D. L., Aarons, G. A., & Green, A. E. (2013). Higher rates of adolescent substance use in child welfare versus community populations in the United States. *Journal of Studies on Alcohol and Drugs*, 74(6), 825–834.
- Ford, T., Vostanis, P., Meltzer, H., & Goodman, R. (2007). Psychiatric disorder among British children looked after by local authorities: Comparison with children living in private households. *The British Journal of Psychiatry*, 190(4), 319–325.
- Fugleberg O, Småstuen M, Tuft P. Innføring i logistisk regresjon: med eksempler på analyse [Introduction to logistic regression: with examples of analyses]. Bergen: Fagbokforlaget; 2018.
- Gilbert N, Parton N, Skivenes M. Child protection systems: International trends and orientations: OUP USA; 2011.
- Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A research note. *Journal of Child Psychology and Psychiatry*, 38(5), 581–586.
- Havnen, K. S., Jakobsen, R., & Stormark, K. M. (2009). Mental health problems in Norwegian school children placed out-of-home: The importance of family risk factors. *Child Care in Practice*, 15(3), 235–250.
- Healy, K., & Oltedal, S. (2010). An institutional comparison of child protection systems in Australia and Norway focused on workforce retention. *Journal of Social Policy*, 39, 255–274.
- Heradstveit, O., Skogen, J. C., Boe, T., Hetland, J., Pedersen, M. U., & Hysing, M. (2018). Prospective associations between childhood externalising and internalising problems and adolescent alcohol and drug use The Bergen Child Study. *Nordic Studies on Alcohol and Drugs*. 35(5), 357–371.
- Heradstveit, O., Skogen, J. C., Hetland, J., & Hysing, M. (2017). Alcohol and illicit drug use are important factors for school-related problems among adolescents. *Frontiers in Psychology*. 8, 1023.
- Heradstveit, O., Skogen, J. C., Hetland, J., Stewart, R., & Hysing, M. (2019). Psychiatric diagnoses differ considerably in their associations with alcohol/drug-related problems among adolescents. A Norwegian population-based survey linked with national patient registry data. *Frontiers in Psychology*, 10, 1003.
- Iversen, A. C., Jakobsen, R., Havik, T., Hysing, M., & Stormark, K. M. (2007). Mental health problems among child welfare clients living at home. *Child Care in Practice*, 13(4), 387–399.
- Keller, T. E., Salazar, A. M., & Courtney, M. E. (2010). Prevalence and timing of diagnosable mental health, alcohol, and substance use problems among older adolescents in the child welfare system. *Children and Youth Services Review*, 32(4), 626–634.
- Kobulsky, J. M. (2019). The prevalence of substance use in child welfare and general population eighth graders in the United States. *Substance Use & Misuse*, 54(10), 1618–1626.
- Kojan, B. H. (2011). Norwegian child welfare services: A successful program for protecting and supporting vulnerable children and parents? *Australian Social Work*, 64(4), 443–458.
- Kojan, B. H., & Lonne, B. (2012). A comparison of systems and outcomes for safeguarding children in Australia and Norway. *Child & Family Social Work*, 17(1), 96–107.
- Kristofersen, L. B., Sverdrup, S., Haaland, T., & Andresen, I.-H. W. (2006). Hjelpetiltak i barnevernet - virker de? [Supportive measures in the child welfare services - do they work?]. Oslo.
- Lehmann, S., Breivik, K., Monette, S., & Minnis, H. (2020). Potentially traumatic events in foster youth, and association with DSM-5 trauma-and stressor related symptoms. *Child Abuse & Neglect*, 101, Article 104374.
- Long, S. J., Evans, R. E., Fletcher, A., Hewitt, G., Murphy, S., Young, H., et al. (2017). Comparison of substance use, subjective well-being and interpersonal relationships among young people in foster care and private households: A cross sectional analysis of the School Health Research Network survey in Wales. *BMJ open*, 7(2), Article e014198.
- Narendorf, S. C., & McMillen, J. C. (2010). Substance use and substance use disorders as foster youth transition to adulthood. *Children and Youth Services Review*, 32(1), 113–119.
- Newcomb, M. D., & Felixortiz, M. (1992). Multiple protective and risk-factors for drug-use and abuse - Cross-sectional and prospective findings. *Journal of Personality and Social Psychology*. 63(2), 280–296.
- NNS. Norwegian National Statistics: Child Welfare 2018 2019 [Available from: <https://www.ssb.no/statbank/table/09050/>].
- NNS. Norwegian National Statistics. Income and wealth statistics for households 2013 [Available from: <https://www.ssb.no/en/inntekt-og-forbruk/statistikker/ifhus/aar/2013-12-18>].
- Orton, H. D., Riggs, P. D., & Libby, A. M. (2009). Prevalence and characteristics of depression and substance use in a U.S. child welfare sample. *Children and Youth Services Review*, 31(6), 649–653.
- Pilowsky, D. J., & Wu, L.-T. (2006). Psychiatric symptoms and substance use disorders in a nationally representative sample of American adolescents involved with foster care. *Journal of Adolescent Health*, 38(4), 351–358.
- Pittenger, S. L., Moore, K. E., Dworkin, E. R., Cnisto, C. A., & Connell, C. M. (2018). Risk and protective factors for alcohol, marijuana, and cocaine use among child welfare-

- involved youth. *Children and Youth Services Review*, 95, 88–94.
- Ruffolo, M. C., Evans, M. E., & Lukens, E. P. (2003). Primary prevention programs for children in the social service system. *Journal of Primary Prevention*, 23(4), 425–450.
- Schulte, M. T., & Hser, Y. I. (2013). Substance use and associated health conditions throughout the lifespan. *Public Health Reviews*, 35(2), 1–27.
- Seip E, Bendiksen LL, Friberg IB, Holtan A, Johansen K, Johansen T, et al. NOU 2018: 18. Trygge rammer for fosterhjem [Secure frameworks for foster homes]. Oslo, Norway: Ministry of Children, Equality and Social Inclusion; 2018.
- Shin, S. H., Miller, D. P., & Teicher, M. H. (2013). Exposure to childhood neglect and physical abuse and developmental trajectories of heavy episodic drinking from early adolescence into young adulthood. *Drug and Alcohol Dependence*, 127(1–3), 31–38.
- Skivenes, M., & Søvig, K. H. (2017). Norway: Child welfare decision-making in cases of removals of children. In K. Burns, T. Pösö, & M. Skivenes (Eds.). *Child Welfare Removals by the State: A Cross-Country Analysis of Decision-Making Systems* (pp. 40–64). NY: Oxford University Press.
- Skogen, J. C., Bøe, T., Knudsen, A. K., & Hysing, M. (2013). Psychometric properties and concurrent validity of the CRAFFT among Norwegian adolescents. *Ung@ hordaland, a population-based study. Addictive Behaviors*, 38(10), 2500–2505.
- Skogen, J. C., Sivertsen, B., Lundervold, A. J., Stormark, K. M., Jakobsen, R., Hysing, M. (2014). Alcohol and drug use among adolescents: and the co-occurrence of mental health problems. *Ung@ hordaland, a population-based study. BMJ Open*. 2014;4(9):e005357.
- Snyder, S. M., & Smith, R. E. (2015). Do physical abuse, depression, and parental substance use influence patterns of substance use among child welfare involved youth? Substance use misuse. *Substance Use & Misuse*, 50(2), 226–235.
- Staer, T. (2016). Risk and Marginalization in the Norwegian Welfare Society: A National Cohort Study of Child Welfare Involvement. *Child Indicators Research*. 9(2), 445–470.
- Thompson, R. G., Jr, & Auslander, W. F. (2007). Risk factors for alcohol and marijuana use among adolescents in foster care. *Journal of Substance Abuse Treatment*, 32(1), 61–69.
- Traube, D. E., James, S., Zhang, J., & Landsverk, J. (2012). A national study of risk and protective factors for substance use among youth in the child welfare system. *Addictive Behaviors*, 37(5), 641–650.
- Traube, D. E., Yarnell, L. M., & Schrage, S. M. (2016). Differences in polysubstance use among youth in the child welfare system: Toward a better understanding of the highest-risk teens. *Child Abuse & Neglect*, 52, 146–157.
- Von Borczyskowski, A., Vinnerljung, B., & Hjern, A. (2013). Alcohol and drug abuse among young adults who grew up in substitute care—findings from a Swedish national cohort study. *Children and Youth Services Review*, 35(12), 1954–1961.
- Wall, A. E., & Kohl, P. L. (2007). Substance use in maltreated youth: Findings from the national survey of child and adolescent well-being. *Child Maltreatment*, 12(1), 20–30.
- Whitesell, M., Bachand, A., Peel, J., & Brown, M. (2013). Familial, social, and individual factors contributing to risk for adolescent substance use. *Journal of Addiction*, 2013.
- Winters, K. C., Stinchfield, R. D., Henly, G. A., & Schwartz, R. H. (1990). Validity of adolescent self-report of alcohol and other drug involvement. *International Journal of Mental Health and Addiction*, 25(11A), 1379–1395.
- Wolke, D., Waylen, A., Samara, M., Steer, C., Goodman, R., Ford, T., et al. (2009). Selective drop-out in longitudinal studies and non-biased prediction of behaviour disorders. *The British Journal of Psychiatry*. 195(3), 249–256.