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Prevalence of psychiatric diagnoses among reform school population – a register-based follow-up study

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Tiivistelmä/Referat – Abstract			
<p>Objectives Adolescents placed in reform schools (RS) are a special group with a risk for many types of lifetime problems. Previous studies on psychiatric morbidity among RS population indicate a wide spectrum of disorders among this population, but more representative information is needed. This follow-up study investigates the prevalence of psychiatric diagnoses among five cohorts of individuals with a history of RS placement. The prevalence rates are also compared to a matched general population sample.</p> <p>Methods The study sample consisted of a complete national cohort of all 1099 people placed in a reform school on the last day of the years 1991, 1996, 2001, 2006 or 2011, and information on psychiatric diagnoses, grouped into eight categories, was collected from the care register of specialized health care. The reform school subjects were compared to a population control group (n = 5437) matched by age, sex and place of birth, the follow-up time being 18 to 38 years.</p> <p>Results Among the individuals with a RS background, 57.4% had at least one diagnosis during the follow-up time, compared to 6.8% among the controls. 30.1% were diagnosed with conduct disorder and ADHD - category diagnosis, 26.4% with substance use disorder, 16.7% with affective disorder, 9.7% with personality disorder, 8.1% with schizophrenia spectrum disorder, 7.0% with mental retardation, 5.8% with disorder of psychological development, and 8.1% with other childhood disorder. All diagnoses were significantly more prevalent among the RS than control group.</p> <p>Conclusions The results of this study contribute to the earlier knowledge indicating that different psychiatric disorders are highly prevalent in RS population and that problems persist also after RS, reminding about the continuous need for support in this population.</p>			
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<p>Tavoitteet Koulukotiin sijoitetut nuoret ovat erityinen ryhmä, jolla riski elämän läpi jatkuviin ongelmiin on suuri. Aiemmat psyykkistä sairastavuutta koskevat tutkimukset ovat antaneet viitteitä monenlaisista ongelmista koulukotipopulaatiossa, mutta kattavampaa tietoa tarvitaan. Tässä seurantatutkimuksessa selvitetään psykiatristen diagnoosien yleisyyttä viidessä koulukotitaustaisessa kohortissa. Häiriöiden yleisyyttä verrataan myös kaltaistettuun yleisväestöotokseen.</p> <p>Metodit Otos koostui viidestä täysin kattavasta kohortista, sisältäen yhteensä 1099 henkilöä, jotka olivat sijoitettuina koulukotiin vuonna 1991, 1996, 2001, 2006 tai 2011. Tiedot psykiatrisista diagnooseista saatiin hoitoilmoitusrekisteristä ja ne luokiteltiin kahdeksaan diagnoosikategoriaan. Koulukotitaustaisia henkilöitä verrattiin yleisväestöotokseen (n = 5437), joka oli iän, sukupuolen ja syntymäpaikan osalta kaltaistettu. Seuranta-aika oli 18–38 vuotta.</p> <p>Tulokset Koulukotitaustaisista henkilöistä 57.4%:lla oli ainakin yksi diagnoosi seuranta-aikana, yleisväestössä vastaava luku oli 6.8%. Koulukotitaustaisista 30.1%:lla oli käytöshäiriö ja ADHD -kategorian diagnoosi, 26.4%:lla päihdehäiriö, 16.7%:lla mielialahäiriö, 9.7%:lla persoonallisuushäiriö, 8.1%:lla skitsofreniaspektrin häiriö, 7.0%:lla kehitysvamma, 5.8%:lla psyykkisen kehityksen häiriö, ja 8.1%:lla muu lapsuusajan häiriö. Kaikki häiriöt olivat merkitsevästi yleisempiä koulukotitaustaisilla kuin verrokkiryhmällä.</p> <p>Johtopäätökset Nämä tulokset vahvistavat aiempaa tietoa siitä, että erilaiset psykiatriset häiriöt ovat hyvin yleisiä koulukotipopulaatiossa, ja että ongelmat jatkuvat myös koulukodin jälkeen. Tulokset kertovat koulukotitaustaisten henkilöiden pitkäkestoisen tuen tarpeesta.</p>			
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Foreword

This master's thesis was written as a part of the project *Koulukodin jälkeen* (KKJ, After Reform School) at the National Institute for Health and Welfare (Terveyden ja hyvinvoinnin laitos, THL). The data for the register-based part of the KKJ project has been gathered in 2012-2014 from several national registers. The study about prevalences of psychiatric disorders was something that still had to be done and so it became my topic. It has been an interesting and rewarding topic in many ways.

The KKJ-project is led by senior researcher Marko Manninen, whom I would like to thank for instructing my work. Likewise, my thanks to Maija Lindgren, my main supervisor at THL, for her precise and effective insights. It was a pleasure to co-operate with you both. In addition to my supervisors, I would like to express my gratitude to Minna Torniainen-Holm from THL, who helped me create the figure on page 17.

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1. Introduction

Adolescents placed in reform schools are under a serious risk of living their lives in social exclusion (Pekkarinen, 2017). Finnish reform schools (RS, suom. koulukoti) are foster care institutions which are focused in treating youth with severe behavior problems. RS placement is not usually the first out-of-home placement for these youth, resulting from earlier solutions not succeeding in ameliorating their circumstances. Previous studies on psychiatric morbidity among RS population indicate a wide spectrum of disorders in this population (Lehto-Salo, 2011; Manninen, 2013), but more representative information is needed because of small sample sizes in previous studies. This follow-up study investigates the prevalence of psychiatric diagnoses among five cohorts of individuals with a history of RS placement. The prevalence rates will also be compared to a matched general population sample. Information on the diagnoses is based on data from the Care Register for Health Care (Hilmo), which includes information from specialized health care and inpatient care. In this study, the individuals with a history of RS placement are referred to as RS population, which is not meant as a stigmatizing term, but a shorter term for ease of writing.

Systematic knowledge about RS adolescents' adult age prognosis is limited (Pekkarinen, 2017). What is known about RS and other resembling populations' prognosis, is that they have a serious risk of persistent conduct problems which may lead to adverse outcomes such as personality disorders (Ebeling et al., 2004), criminality (Manninen, Suvisaari, Marola, & Aaltonen, 2017), issues in reproductive health (Lehti, Gissler, Suvisaari, & Manninen, 2015) and premature death (Manninen, Pankakoski, Gissler, & Suvisaari, 2015). Existing studies clearly indicate that detained adolescents suffer from many kinds of mental health issues, also outside the externalizing spectrum (Colins et al., 2010; Fazel, Doll, & Långstr, 2008) and internalizing symptoms often remain unnoted and untreated. Knowing more about the psychiatric profile of this population is important in order to provide effective interventions. Together the pre-existing qualitative information and the new register-based information will give a clearer image of what happens to these individuals after RS.

1.1 Reform schools

1.1.1 Reform schools as part of child welfare services

Reform schools are a part of the Finnish child welfare services, offering special care to youths with severe conduct problems and difficult living situations. At present, there are seven RS's in Finland, with the smallest of them having 18 and biggest 59 vacancies for placement (Pekkarinen, 2017). In year 2016, 57784 children and adolescents were clients of open care child welfare services, and 17330 minors were placed outside home (Kuoppala & Säkkinen, 2016). Less than 2% of these are RS placements. RS's are often described as the final step in treating "hard to handle" youth (Pekkarinen, 2017; Pösö, Jahnukainen, 2004). RS placement is chosen when adolescents are in a high risk for mental health and substance related disorders and social exclusion in adulthood, and when lesser measures are unlikely to stop this development (Pekkarinen, 2017). Services offered in RS's include both education and care, and the RS's also offer mental health services. A challenge for RS's is the limited time they have for improving their youths' circumstances. The resources for offering aftercare are limited, and reorganizing child welfare services has also resulted in shorter placement durations.

Adolescents placed in RS have usually received several open care interventions and have typically had school problems such as truancy and special teaching for some time before placement (Kitinoja, 2004). Other common problems are substance use and family related problems (Kitinoja, 2004; Lehto-Salo, 2011). Often RS is the last one of many placements for the adolescent, and the usual reasons for placement include aiming to set limits and secure the adolescents' school attendance (Kitinoja, 2004; Pekkarinen, 2017). The placement can last from one month to several years.

The Finnish RS aims at changing the path of adolescents by using an approach that is mainly therapeutic. It appears that facilities with a more punitive approach, like juvenile detention centers as well as actual prisons, regardless of not actually offering mental health interventions, tend to have a slightly decreasing effect on the offenders' mental health symptoms (Gonçalves, Endrass, Rossegger, & Dirkzwager, 2016; Lennox, Bell, O'malley, Shaw, & Dolan, 2006). This is at least partly because of the positive effect these institutions have on their inhabitants' otherwise chaotic lifestyle, where basic needs like housing and feeding are not always satisfied (Lennox et al., 2006).

Because of the differing approaches to the delinquent behavior, international results about incarcerated youths' and results about RS populations' mental health are not entirely comparable. For example in a Dutch sample of incarcerated boys, the rates of anxiety and affective disorders were relatively low compared to North-American studies (Vreugdenhil, Doreleijers, Vermeiren, Wouters, & Van Den Brink, 2004). This was explained as a result of the better availability of mental health services for underprivileged adolescents with internalizing problems in the Netherlands. Also the RS system invests in identifying and treating mental health problems, which may show as a decrease in some of the symptoms.

1.1.2 Adult age prognosis

There are many causes effecting the later life paths of RS adolescents; what happens after RS is affected by the individual qualities and histories of child welfare services and reasons of placement (Jahnukainen, 2004). A previous longitudinal follow-up study with a small sample of adolescents investigated the level of socially normative events and accumulated risk behaviors in the years following RS (Jahnukainen, 2004). The individuals were classified into three different groups according to their paths after RS; those who managed to organize into society, those who kept risk-behaving, and an unstable group between these two paths. For example, according to this study, those placed in RS because of school problems have a better prognosis than those placed primarily for substance use or criminal acts (Jahnukainen, 2004). Also the qualities of the RS, such as ways of working, staff characteristics and resources, can have an effect (Pekkarinen, 2017).

Conduct problems in childhood and adolescence are related to a number of adverse later life outcomes. A follow-up study of British males from age 8 to 48 followed pathways in offending with the subjects divided to four categories: non-offenders, adolescence-limited offenders, late-onset offenders, and persistent offenders (Farrington, Ttofi, & Coid, 2009). Individuals in all categories reached a better level of functioning (in terms of housing, employment, health, etc.) over time; the adolescence-limited offender group had reached the level of non-offenders in success by age 48. Greatest risk-factors for persistent offending at ages 8-18 were heavy drinking at age 18, hyperactivity at 12-14 years age, and parental harsh child rearing style and low popularity at ages 8-10 (Farrington et al., 2009). A Finnish long-term outcome study of 2556 boys born in 1981, followed from age 8 to adulthood, found children with both conduct problems and internalizing symptoms to have the worst outcomes with highest risks for psychiatric disorders and criminal acts,

when compared to boys with only conduct or attention problems (Sourander et al., 2007). The risks were also elevated for children with only CD, but their long-term outcomes were clearly better than for those with both conduct and internalizing problems in childhood (Sourander et al., 2007). These earlier results indicate that individuals with conduct problems have many kinds of vulnerabilities, and complex problems in childhood are likely to persist until adulthood. Similarly, the RS population is likely to have problems also in adulthood, which can also show in mental disorder rates.

Premature death in delinquent populations is known to be considerably more common than in the general population. Mortality in the RS population has been studied with the data used also in this study. The study shows that RS populations' mortality during the follow-up time up to 22 years was 6.7%, and for controls 1.0% (Manninen et al., 2015). The rate was expectedly higher for males, 8.1%, and 2.2% for females. Comparing to controls, death for substance related reasons in the RS group had a hazard ratio of 24.3, being high also for suicide: 7.2, and 5.5 for other external reasons (Manninen et al., 2015). A register-based follow-up of young Finnish offenders in forensic psychiatric examination observed 22.1% of delinquents and 3.4% of controls to have died by the end of the follow-up (Lindberg, Miettunen, Heiskala, & Kaltiala-Heino, 2017). The risk of unnatural death was close to 11-fold in male delinquents, over fourfold for death of unclear reason, and twofold for natural death compared to controls. A British study following its male participants until their late middle age also observed chronic offenders to be in the highest risk of death, also after controlling for individual and childhood risk factors and partaking in other risk behaviors (Piquero, Farrington, Shepherd, & Auty, 2014). The high risk for premature death in RS and delinquent populations clearly shows the importance of knowing more about the psychiatric profile of this population in order to provide effective interventions.

Known later life problems among RS population include criminality and pregnancy related issues. A follow-up study of RS adolescents, using the same data as this study, found 66% of the adults (78% of males and 41% of females) with RS background to have committed at least one crime (Manninen et al., 2017). Risk for criminal conviction was 13-fold compared to general population, and 18-fold for violent crime. Women with a RS background have more induced abortions and pregnancies as teenagers or minors than controls (Lehti et al., 2015). In addition, the mothers with RS background are more often single, smoke more during pregnancy, and have a heightened risk of having a preterm or low birth weight child (Lehti et al., 2015).

Delinquent tendencies are often correlated with limitations in cognitive capacities (Kaltiala-Heino, Kaivosoja, & Ritakallio, 2006). Language impairments seem to be strongly linked to delinquent behavior (Anderson, Hawes, & Snow, 2016). In criminal populations, verbal intelligence quotient (IQ) is generally lower than performance IQ, a phenomena known as P > V sign (Isen, 2010). Low verbal ability has been linked to persistent offending also in the RS population (Manninen et al., 2013), whereas low nonverbal IQ at age 8-10 has been linked to late onset (after age 21) criminality (Farrington et al., 2009). Delinquents' IQ seems to be generally lower than that of the general population (Romi & Marom, 2007), and in a UK study of boys in secure care for serious offending, 27% of boys had an IQ under 70 (Kroll et al., 2002).

Overall, it seems clear that individuals with a RS background have a high risk for instability and many types of adverse later life events. With the present study, we can fill some gaps in the systematic knowledge about later life events of the RS population, with a broader sample and a mean follow-up time of 27 years.

1.2 Psychiatric morbidity among adolescents in foster care

Some recent review studies about psychiatric morbidity among youths in foster care have reported consistent prevalence rates, with conduct disorder (CD) being the most common disorder followed by disorders such as attention deficit hyperactivity disorder (ADHD), depression and substance use disorder (Colins et al., 2010; Fazel et al., 2008). In a review of mental health problems among youths in juvenile detention and correctional facilities, of boys 52.8% were diagnosed with CD, 11.7% with ADHD, 10.6% with major depression, and 3.3% with psychotic illness (Fazel et al., 2008). Also in girls 52.8% were diagnosed with CD, 29.2% with major depression, 18.5% with ADHD, and 2.7% with psychotic illness. Another review, which focused on investigating psychiatric disorders only among detained male adolescents, reported the mean prevalence of any disorders to be 69.9% (Colins et al., 2010). Mean prevalences for separate disorders were 46.4% for CD, 45.1% for substance use disorder, 19.8% for oppositional defiant disorder, 15.9% for anxiety disorders, 13.5% for ADHD, 12.0% for major depression disorder and 9.6% for post-traumatic stress disorder. Psychotic disorders were reported in only three studies, with a mean prevalence estimate of 1.35% (Colins et al., 2010).

A literature review found the prevalence of delinquency in autism spectrum disorders (ASD) populations to vary in 5-26%, while the prevalence of ASD in offending youths was 2-18% (Rutten, Vermeiren, & Van Nieuwenhuizen, 2017). The sources of uncertainty in the reviewed studies were many, including diversity of samples and use of different diagnostic instruments, and thus the link between ASD and delinquency still needs further research.

Psychiatric comorbidity is common among youth living in correctional facilities. In a sample of detained youths in U.S., 66% had at least one psychiatric disorder and 43% had two or more disorders (Washburn et al., 2008). Another U.S. study found a subgroup of 13-17-year-old incarcerated youths referred for mental health services to have a mean of 4.4 Diagnostic Interview Schedule for Children (DISC) diagnoses (Rogers, Pumariega, Atkins, & Cuffe, 2006). A study of Portuguese young male offenders found over 91.2% to have some mental health disorder and the majority of them to fulfill criteria for more than one disorder (Rijo et al., 2016). With regard to these findings, it seems likely that a high rate of comorbidity or more than one lifetime disorder is also observed in the RS population.

These reviews suggest that it is common for detained adolescents to suffer from many kinds of mental disorders, also outside the externalizing spectrum. Externalizing disorders mean disorders such as CD and antisocial personality, where symptoms result from deficits in self-regulation or undercontrolling impulses (Merrell, 2008). Internalizing disorders like depression and anxiety on the contrary are result from maladaptive overcontrolling of emotions or cognitions. Both types of symptoms can exist simultaneously (Merrell, 2008).

1.2.1 Conduct disorder

The International Classification of Diseases, 10th version (ICD-10) describes CD as characterized by regularly occurring asocial, aggressive or defiant behavior (World Health Organization, 1992). At worst, CD is a serious risk with regard to social relationships, health and education (Ebeling et al., 2004). According to a review among adolescents in general population, 2-12% are diagnosed with CD (Loeber, Burke, Lahey, Winters, & Zera, 2000). The variation in the prevalence of CD is affected by differing diagnostic criteria used in studies (Loeber et al., 2000). CD is important when studying the RS population, as the essential reasons for RS placements are patterns of behavior also listed as diagnostic criteria for CD, for example aggression, running away and school truancy.

From a developmental perspective, CD is correlated with inconsistent parenting and problems in family interaction, which indirectly result in wider problems such as academic problems and rejection by normative peers (Patterson, DeBaryshe, & Ramsey, 1989). This development is followed by depressed mood and joining a deviant peer group, which in turn increase the likelihood of adopting a chronic delinquent behavior pattern. CD can begin in early childhood, or it can be adolescence-limited, and the most severe disorder types begin in early age and continue until adulthood (Moffitt, 1993). Comorbid disorders are common with CD, and risks for especially substance use and antisocial personality disorder are heightened (Ebeling et al., 2004).

Boys meet the criteria for CD clearly more often than girls; general population rates for boys vary between 1.8-16.0% and for girls between 0.8-9.2% (Loeber et al., 2000). Main contextual variables behind CD seem to be shared between boys and girls: negative parenting and impoverished environment are risk factors for CD for both genders (Berkout, Young, & Gross, 2011). However, girls that have been exposed to physical child abuse are more often arrested for violent offenses than boys with similar background (Herrera & McCloskey, 2001). This was suggested to point out to the possibility that girls have to be exposed to more severe abuse to result in violent tendencies compared to boys.

Delinquent girls seem to have generally more severe maltreatment histories than boys (Abrantes, Hoffmann, & Anton, 2005). There are also some sex differences in the manifestation of CD and related symptomatology. Males' conduct problems include more overt forms of disruptive behavior, whereas females commit more covert delinquent acts such as shoplifting and fraud (Loeber et al., 2000). In detained adolescent populations, mental health symptoms and psychiatric disorders in general are more prevalent in females than males (Abrantes et al., 2005; Ford, Grasso, Hawke, & Chapman, 2013; Grande et al., 2012). In a study of Finnish RS adolescents, the most troubled group in terms of cumulated problems was a group of girls with comorbid CD, substance use disorder and mood disorder (Lehto-Salo, 2011).

1.2.2 Substance use disorders

Substance and alcohol use is strongly associated with different forms of disruptive behavior in Finland; for example, in ca. 80% of homicides the offender is intoxicated, indicating the strong connection between antisocial behavior and substance use among Finnish offenders (Lehti, 2013).

Among prisoners the occurrence of substance dependence is ten times that of general population, and substance related problems have become more common in the last decades (Joukamaa et al., 2010). Similarly, according to RS staff, substance related problems have lately become more common among RS adolescents (Pekkarinen, 2017). Prevalence of substance use disorders is likely to be high among the RS population.

1.2.3 Suicidality

Suicidality is a critical problem among juvenile delinquents. Among the general population, suicide is more common in Finland than in many other European countries (Schmidtke et al., 1996; Wasserman, Cheng, & Jiang, 2005). In the Finnish general population the number of suicides in 2016 was 787 (0.01% of population) (*Statistics Finland*, 2017), and the rate among Finnish prisoners in years 2011-2014 was 0.1%, approximately tenfold compared to the rate in general population (Fazel, Ramesh, & Hawton, 2017). A Dutch study found that in incarcerated females 58.1% had suicidal thoughts during the past year, whereas 14.4% of the females in school based samples reported them (Suk et al., 2009). For males the responding numbers were 21.5% vs. 6.7%. In a U.S. study of male juvenile delinquents with CD, assessed with a semi-structured interview for suicidality and psychopathology, 34% had a history of suicidal thoughts or attempts (Ruchkin, Schwab-Stone, Kopolov, Vermeiren, & King, 2003). Suicidal attempters and ideators had markedly more psychopathology and exposure to violence compared to the non-suicidal group (Ruchkin et al., 2003). These rates indicate the generality of internalizing symptoms among delinquent populations.

1.2.4 Personality disorders

Personality disorders are not diagnosed in individuals under minimum 16 years of age (World Health Organization, 1992), but in older offending populations they are common. In a Swedish study of male offenders on probation, the prevalence of borderline personality disorder (BPD) was 19.8% (Wetterborg, Långström, Andersson, & Enebrink, 2015). Having a BPD diagnosis was related to having significantly more psychiatric comorbidity with a mean of 6.2 disorders, compared to a mean of 3.6 disorders among those without a diagnosis for BPD, and also to a greater recidivism risk in the probationers (Wetterborg et al., 2015). Personality disorders are more common among criminal populations compared to general population (Yu, Geddes, & Fazel, 2012), which highlights the importance of knowing their prevalence also in the RS population. A Finnish follow-up study of 508 13-17 year old female adolescents in acute psychiatric inpatient care, with

early adult follow-up information gathered from the Care Register for Health Care, 39% of the individuals diagnosed with a personality disorder had committed a crime (Arola et al., 2016). The likelihood of committing a violent crime increased significantly for women with BPD (odds ratio (OR) 6.09), and was also related to child welfare placement (OR 11.82), parent's substance use disorder (OR 7.74) and CD (OR 4.26).

1.2.5 Psychosis continuum and schizophrenia

Psychotic-like experiences, such as perceptual abnormalities and delusional ideas not reaching the psychotic threshold are, according to a meta-analysis, experienced by as much as 78% of detained male adolescents (Colins et al., 2010). In comparison, a meta-analysis of psychotic-like symptoms among general population adolescents aged 13–18 years found the prevalence of symptoms to be 7.5% (Kelleher et al., 2012). Among detained adolescents, these experiences appear to be partially explained by substance use and trauma; past year intense marijuana use and trauma from emotional abuse are both positively associated with having psychotic-like experiences (Colins et al., 2009). Also paranoid-like suspicious experiences are associated with emotional abuse.

Schizophrenia is also more common among individuals with a delinquent background than general population. The prevalence of schizophrenia in the RS population data used also in this study is known to be eight-fold (HR 8.01) compared to the population controls (Manninen, Latvala, Torniainen-Holm, Suvisaari, & Lindgren, 2018). Other background factors – age at the time of first out-of-home placement, placement instability, cohort and gender – do not predict later schizophrenia. A Finnish nationwide register-based study of serious delinquency and later schizophrenia found schizophrenia also to be multiple times more prevalent in the delinquent individuals during later life, with a prevalence of 12.8% in the delinquents and 0.9% in controls (Lindberg, Miettunen, Heiskala, & Kaltiala-Heino, 2017).

1.3 Mental health problems among reform school population

The psychiatric morbidity of RS adolescents has been previously studied with smaller samples, with results showing the severity of both externalizing and internalizing symptoms. A study of 87 RS adolescents found that 89% of the adolescents had at least one psychiatric diagnosis, most common disorders being CD (with high comorbidity) diagnosed in 76%, followed by mood disorders (50%) and substance use disorders (40%) (Lehto-Salo, 2011). Learning disabilities were also common, with 59% having difficulties in areas of reading or mathematics (Lehto-Salo, 2011). A study with a sample of 48 RS adolescents found an excess of both externalizing and internalizing symptoms compared to general population (Manninen et al., 2010). Especially boys' internalizing problems were not always noticed by the RS workers and consequently did not receive treatment.

Alexithymia, the inability to identify and express one's feelings, is also common among RS adolescents, especially among individuals with internalizing symptoms (Manninen et al., 2011). To summarize, RS adolescents' most typical symptomatology is in the externalizing spectrum, but to make effective treatment possible, internalizing symptoms are also important to be explored. It is likely that symptoms also outside the externalizing spectrum exist already before and during RS placement, and it would be beneficial if RS's had means to identify and treat all kinds of problems. It is likely that because of the relatively complex problems at a young age in the RS group, many of the disorders reach a diagnosable level at a younger age than in general population. RS would accordingly be in central position in early intervention.

Some uncertainty of the psychiatric morbidity among detained youth populations remains.

According to Fazel et al's review (2008), there is a difference between DISC (Diagnostic Interview Schedule for Children) and screening by interview; the DISC may give lower prevalence estimates for depression, ADHD and CD, while interview with a psychiatrist may produce lower estimates for depression. Taken together, the results from previous studies suggest an excess of psychiatric problems among Finnish RS population. Many of the earlier studies are cross-sectional, and this study will add new longitudinal information about the mental health of youths in foster care due to severe behavioral problems.

1.4 Study questions and hypotheses

There are a number of factors suggesting the RS population to be in a high risk for mental health problems that need treatment also after leaving the RS. Conduct problems and related symptomatology are known to be of persistent nature with difficulties such as personality disorders and criminality among their well-known consequences (Ebeling et al., 2004). Conduct problems have many types of linked symptomatology, history of traumatic experiences is common and the risk for premature death is high. Especially internalizing symptoms can be ‘covered’ by externalizing problems and as a result remain untreated. In order to provide treatment that works, it is important to have specific information about the full spectrum of disorders that are typical for individuals with a RS background. This study will contribute to the existing knowledge by exploring RS population’s psychiatric morbidity with a comprehensive sample of five full cohorts and register-based follow-up data.

The specific aims and hypotheses of this study are

1. To assess the prevalence of different psychiatric disorders among RS population, comparing to the control participants from the general population

H1: Individuals with RS background have higher prevalence of all psychiatric disorders compared to the controls.

2. To assess whether RS and general population differ in the age of the diagnosis

H2: Some disorders like substance use and personality disorders are diagnosed earlier in RS population than in the general population

2. Methods

2.1 Sample and procedure

The study design was a register-based follow-up, using information from three national registers. The RS sample (n=1099) consisted of five RS cohorts picked from the Child Welfare Register. The register includes information about all Finnish children placed outside home since 1991, including type and duration of placement. Individuals selected for the study had an out-of-home placement status in a RS on the last day of year 1991, 1996, 2001, 2006 or 2011. A control group (n=5437) for the RS sample was collected from the Finnish Central Population Register. For each RS individual, five controls (four when more were not available) were picked that matched by sex, age and place of birth (municipality). Year of birth of the participants ranged from 1973 to 2001. Registry data was collected until 31.12.2014, which translates to follow-up time ranging from 18 to 38 years (mean 27.5 years, sd = 7.1). Study sample information is presented in Table 1.

Table 1. Study sample information

Cohort	RS			Controls			Mean follow-up time (y)
	M	F	Total	M	F	Total	
1991	144	47	191	707	234	941	37.8
1996	136	62	198	674	308	982	33.4
2001	134	68	202	662	338	1000	28.5
2006	153	95	248	753	469	1222	23.4
2011	150	110	260	747	545	1292	18.5
Total	717	382	1099	3543	1894	5437	27.5

Abbreviations: M = males, F = females, y = years

Information on lifetime psychiatric diagnoses was acquired from the Care Register for Health Care, including information on disorder type and time of first diagnosis from specialized health care and inpatient care. The diagnoses were grouped into eight diagnosis categories; 1) CD and ADHD, 2)

substance use disorders, 3) affective disorder, 4) personality disorder, 5) psychotic disorders, 6) mental retardation, 7) disorders of psychological development, 8) other childhood disorders. Information from general practitioner or occupational health clinics are not included in the register. The ICD-8, 9 and 10 diagnoses included in each of the diagnosis categories can be found in the supplement. Anxiety and eating disorders in whole had to be left out of the data, because with these disorder types the differences between ICD-8, 9 and 10 are so remarkable that reliable classification was not possible for them.

2.2 Statistical methods

Variables used in the analyses were the eight diagnosis categories and age at the time of diagnosis. For each individual, all of the diagnosis categories had a 0/1 value and more than one diagnosis category per individual was possible. Frequencies were explored for number of diagnosis categories for each individual during follow-up time. To assess the significance of differences between RS and control groups, males and females of both groups, and males and females in the RS group in diagnosis frequencies, number of diagnoses and mean ages of diagnosis, t-tests (two-tailed, Levene's test for Equality of Variances considered) were used.

Next, the group differences were explored using cox regression. Cox regression is a survival analysis applicable for categorical variables, where included individuals are followed until the event of interest occurs or until the end of follow-up time. Cox regression produces a hazard ratio (HR), which is an effect size that quantifies the relationship between two variables, in this case belonging to the RS group and having a diagnosis. The analyses were made using IBM SPSS Statistics, version 25. Figure 1 was created with R, using add-on package muhaz.

3. Results

Among the individuals with a RS background, the most common disorders were CD and ADHD diagnosed in approximately one third of the group, substance use disorders diagnosed in one fourth of the group, and affective disorders diagnosed in less than one fifth of the group (Table 2.). The difference of diagnosis frequencies between RS and control groups was significant for all eight diagnosis categories (Table 2.). The hazard ratios in the RS group compared to controls for being diagnosed with psychiatric disorders can be seen in Table 2. Hazard ratios were higher in RS group comparing to controls for all disorders.

Table 2. Prevalences of psychiatric diagnoses in RS and control groups

	RS n (%)	C n (%)	Sig RS vs. C	HR (95% CI) RS vs. C
CD and ADHD	331 (30.1)	43 (0.8)	***	45.06 (32.79 – 61.93)
Substance use disorders	290 (26.4)	96 (1.8)	***	17.32 (13.75 – 21.82)
Affective disorders	184 (16.7)	146 (2.7)	***	6.77 (5.45 – 8.41)
Personality disorders	107 (9.7)	52 (1.0)	***	10.72 (7.70 – 14.93)
Schizophrenia spectrum disorders	89 (8.1)	59 (1.1)	***	7.77 (5.90 – 10.95)
Mental retardation	77 (7.0)	41 (0.8)	***	9.62 (6.58 – 14.05)
Disorders of psychological development	64 (5.8)	76 (1.4)	***	4.25 (3.05 – 5.93)
Other childhood disorders	89 (8.1)	37 (0.7)	***	12.36 (8.43 – 18.14)
Any disorder / at least one diagnosis	631 (57.4)	369 (6.8)	***	12.19 (10.72 – 13.88)

Abbreviations: RS: Reform school group; C: comparison group, HR: Hazard ratio. Difference between RS and Control groups: *** = $p < .001$

Among both genders, differences between RS and control groups were significant (Table 3.). In the RS group, females had significantly more affective disorders than males (Table 3.). RS males had significantly more CD and ADHD –diagnoses, mental retardation and disorders of psychological development than RS females, and they had significantly more often at least one diagnosis (Table 3.).

Table 4. shows lifetime number of diagnosis categories for RS and control groups. In the RS group, 57% of the group had at least one type of psychiatric diagnosis and about a third had two or more types of diagnoses. In the control group, less than a tenth had a diagnosis and under 3% had more than one diagnosis.

Table 3. Prevalences of psychiatric diagnoses in RS and control groups among males and females

	Males			Females			RS
	RS n (%)	C n (%)	Sig RS vs. C	RS n (%)	C n (%)	Sig RS vs. C	Sig F vs. M
CD and ADHD	239 (33.3)	32 (0.9)	***	92 (24.1)	11 (0.6)	***	***
Substance use disorders	202 (28.2)	75 (2.1)	***	88 (23.0)	21 (1.1)	***	ns
Affective disorders	100 (14.0)	75 (2.1)	***	84 (22.0)	71 (3.8)	***	***
Personality disorders	75 (10.5)	28 (0.8)	***	32 (8.4)	24 (1.3)	***	ns
Schizophrenia spectrum disorders	57 (8.0)	47 (1.3)	***	32 (8.4)	12 (0.6)	***	ns
Mental retardation	68 (9.5)	33 (0.9)	***	9 (2.5)	8 (0.4)	***	***
Disorders of psychological development	53 (7.4)	62 (1.8)	***	11 (2.9)	14 (0.7)	***	**
Other childhood disorders	54 (7.5)	20 (0.6)	***	35 (9.2)	17 (0.9)	***	ns
Any disorder / at least one diagnosis	439 (61.2)	249 (7.0)	***	192 (50.3)	120 (6.3)	***	***

Abbreviations: RS: Reform school group; C: comparison group. Difference between groups: *** = $p < .001$, ** = $p < .01$, ns = nonsignificant

Table 4. Number of diagnosis categories during follow-up.

Number of diagnosis categories	RS		Control	
	n	%	n	%
0	468	42.6	5068	93.2
1	285	25.9	238	4.4
2	185	16.8	94	1.7
> 3	161	14.7	37	0.7

The mean age for the first diagnosis also differed significantly between RS and control groups for all other diagnosis categories, except the CD and ADHD -category (Table 5.). Diagnosis age was lower for RS group compared to controls in substance use disorders, affective disorders, personality disorders and schizophrenia spectrum disorders, and higher in mental retardation, disorders of psychological development and other childhood disorders. RS population females had significantly lower mean age of diagnosis for affective disorders and any disorder than control group females. Control females had significantly lower mean age of diagnosis for other childhood disorders. Among males, RS and control groups differed significantly in all diagnosis categories, mean age of diagnosis being lower in the RS group for substance use disorders, affective disorders, personality disorders, schizophrenia spectrum disorders and any disorder. Mean age of diagnosis was higher among the RS males for CD and ADHD, mental retardation, disorders of psychological development and other childhood disorders.

Figure 1 shows the risks for RS and control males and females for being diagnosed with any disorder during the follow-up time. The risk for first diagnosis peaked for both RS men and women at about 15 years age, and remained higher than control group's until the end of the follow-up time. After 35 years age the risk among RS and control group for getting the first diagnosis was about similar, meaning that if the RS individual has not been diagnosed until 35 years' age, the risk for diagnosis decreases to the same level with general population.

Table 5. Mean age at the time of the first diagnosis.

	Total			Males			Females		
	RS	C	Sig	RS	C	Sig	RS	C	Sig
CD and ADHD	12.5	11.3	ns	12.1	10.2	**	13.4	14.7	ns
Substance use disorders	20.7	22.5	**	21.0	22.8	**	19.9	21.4	ns
Affective disorders	17.6	21.2	***	17.9	21.6	***	17.2	20.7	***
Personality disorders	20.8	23.1	*	20.3	22.9	*	22.0	23.3	ns
Schizophrenia spectrum disorders	19.6	23.0	***	19.7	23.8	***	19.6	19.8	ns
Mental retardation	10.6	8.0	***	10.5	7.9	**	11.4	8.1	ns
Disorders of psychological development	10.2	7.3	**	10.6	7.0	***	8.7	9.1	ns
Other childhood disorders	12.0	9.3	*	11.4	8.7	**	13.0	10.1	*
Any disorder	14.3	16.1	***	14.0	15.6	**	15.1	17.2	**

Abbreviations: RS: Reform school group; C: comparison group. Difference between RS and Control group: *** $p < .001$, ** $p < .01$, * $p < .05$, ns = nonsignificant

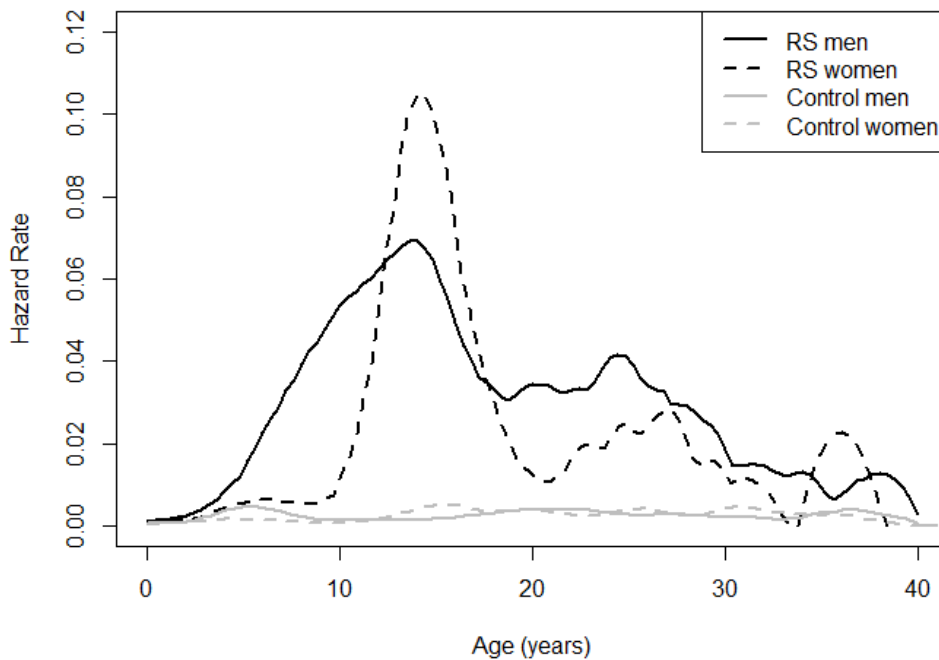


Figure 1. Risk for being diagnosed with any disorder during follow-up.

4. Discussion

The purpose of this study was to get information about RS populations' psychiatric morbidity utilizing long-term register-based information covering a large group of individuals. The new results show that the risk for getting a psychiatric diagnosis is significantly higher among the RS population compared to general population peers. The risk for being diagnosed with any of the psychiatric diagnoses is likewise multiple among the RS individuals, with hazard ratios ranging from fourfold in disorders of psychological development to 45-fold in CD and ADHD.

These results confirm that mental health problems are multiple times more common in the RS population, a finding which is in line with the previous studies around the same topic but with smaller samples and a more qualitative focus (Lehto-Salo, 2011; Manninen, 2013). The register-based information from this study gives reliable support to the existing knowledge about the underprivileged status of this group and other resembling populations.

The hypothesis of the first study question was supported; all disorders were overrepresented in the RS group, compared to general population. Also the risk for psychological morbidity remained higher for the RS group during the entire follow-up time. The common reasons for RS placement are conduct problems which are known to associate with a high risk of different types of later life adversities (Ebeling et al., 2004; Farrington et al., 2009; Sourander et al., 2007). The continuous high risk of psychiatric problems is a feature that demonstrates the lifetime persistent disadvantaged position of this group. The high hazard ratios in all disorder groups tell about the continuous vulnerability of the RS group; conduct problems in childhood and adolescence are a special signal of a risk for later problems such as personality disorders, affective disorders and substance use disorders.

The second aim of the study was to assess the differences of age of diagnosis between RS and control group. The results showed that late adolescence and adulthood diagnoses have lower age of diagnosis in the RS group, whereas developmental and childhood disorders are diagnosed earlier in the general population. RS individuals were diagnosed significantly earlier with schizophrenia spectrum disorders, substance use disorders, affective disorders and personality disorders, whereas

the controls received a diagnosis significantly earlier for mental retardation, disorders of psychological development and other childhood disorders. The only diagnosis group where the ages of diagnosis did not differ significantly was CD and ADHD.

Approximately one third of the RS group had CD or ADHD. The rate is lower than some earlier prevalence estimates, where about 50% of adolescents in juvenile and correctional facilities have been diagnosed with CD (Fazel et al., 2008). The lower rate compared to results from previous studies may partly be explained by the study data including only specialized health care information, leaving out less severe cases who have been treated by general practitioner. Also, diagnosing ADHD has become more usual during the past decades (Getahun et al., 2013), resulting hypothetically from increased awareness and better recognition of the condition, which is why younger cohorts may have more of these diagnoses than the older ones. Screening for mental health problems has not originally been a priority in the RS, as the treatment has focused on psychosocial wellbeing only about the last thirty years (Kitinoja, 2004). The RS treatment model was earlier based on social sciences and mental health has started to receive more attention only in the recent decades. Because of this, older cohorts in the study may be underdiagnosed with CD and ADHD, which may play a part in the relatively low rate of these diagnoses.

Substance use disorders were the second most prevalent disorder: during the follow-up time, a quarter of the RS population received a substance use disorder diagnosis. RS population are a special subgroup of adolescents with multiple persistent problems, and the risk for continuous difficulties after leaving RS system is high. Substance use disorders are one of the biggest problems among this group, and according to RS staff these problems have become more severe in the past years (Pekkarinen, 2017). The period the adolescents spend in RS offers an important chance for demanding interventions before adulthood. Controlling current substance use, emphasizing effective rehabilitation and addressing future desistance is one of the important possibilities that the RS placement can facilitate.

The risk sizes for psychiatric disorders shown by this study between RS and control group resemble the pre-existing knowledge about death rates and causes in these groups. Substance related death and suicide are much more common among RS population (Manninen et al., 2015), and this study shows similarly that substance use disorders and affective disorders are highly more prevalent among the RS group. Risk for both substance use disorders from this study, and substance related

death shown by Manninen et al (2015), are over tenfold in the RS population, and it is thus clear that this is one of the most focal problems that should be treated effectively as early as possible.

Affective disorders were more common among females than males in the RS group, diagnosed in about fifth of the females. This is in line with the previous findings according to which detained girls have more mental health problems in general than boys and that internalizing symptoms are very usual among girls with conduct problems (Abrantes et al., 2005; Fazel et al., 2008; Grande et al., 2012).

The risk for personality disorders was tenfold in the RS population compared to controls, and differences in the prevalence rates were similar among females and males. This is an expected rate, taken into account that personality disorders are more common among offending populations (Arola et al., 2016; Yu et al., 2012), and knowing that CD is a precursor for some personality disorders (Ebeling et al., 2004).

Schizophrenia spectrum disorder was diagnosed in 8% the RS group, a rate that is close to earlier related studies with RS group and Finnish delinquents (N. Lindberg et al., 2017; Manninen et al., 2018). RS males received a diagnosis from this category significantly earlier than control males. Earlier diagnoses in mental illnesses like schizophrenia spectrum disorders can be associated with more severe illness and worse prognosis. Being diagnosed with a psychiatric condition at a young age means that the illness has more time to limit the individual's functional capacity, which increases obstacles for reaching normative developmental tasks. Those suffering psychotic symptoms are a problematic group also because these types of symptoms are easily left without attention, if the treatment staff doesn't specifically ask about them (Riecher-Rössler et al., 2007).

Mental retardation, disorders of psychological development and other childhood disorders were also more prevalent among RS group, and they were diagnosed significantly later in the RS group than controls. The higher rate of mental retardation among RS group is in line with the previous knowledge about connections between conduct problems and limitations in cognitive abilities such as language difficulties and low IQ (Anderson et al., 2016; Kroll et al., 2002; Romi & Marom, 2007) as well as previous findings on the neuropsychological deficits among the RS population (Lehto-Salo, 2011; Manninen et al., 2013). Later morbidity among the RS population in mental retardation, disorders of psychological development and other childhood disorders can partly be

explained by general population individuals speculatively having a more supportive childhood family that is active in getting treatment for their children if problems arise. Also, conduct problems beginning in childhood can ‘cover’ other simultaneous psychopathology, meaning that other types of symptoms do not receive attention.

Over half of the RS group had at least one psychiatric diagnosis and about a third had a diagnosis from more than one category. These rates are close to those discovered among US detained youths; 66% were diagnosed with at least one disorder, 43% with two or more (Washburn et al., 2008). Even though the majority of RS population had some diagnosis, about 40% did not have a psychiatric disorder diagnosed and treated in specialized health care. This may reflect a part of the RS population who doesn’t suffer serious mental illnesses, and on the other hand mental health problems that are less severe and do not require specialized health care.

The typical time spent in RS has become shorter in the past years, due to changes in policies in organizing child welfare services (Pekkarinen, 2017). The placement begins later and the adolescents are moving on from the RS at an earlier phase. This means that the RS has less time to offer what it could in a more optimal setting. As the RS youths are a group with special needs, the period of emancipation can be an extra challenge for them. Meeting the needs of this troubled group upon emerging adulthood is a challenge for RS aftercare. The youths may also realize the benefits of an outside support network at a later phase, when aftercare is no longer available, adding to the risk of social exclusion (Jahnukainen, 2004; Pekkarinen, 2017). Getting diagnosed and treated for serious mental illnesses is likely to be a time of crisis for any individual, but in case of disorders diagnosed after leaving RS, extra stress may be caused from no longer having a support network from the child welfare services. According to this study, the mean age of diagnosis is before age 18 in most of the disorders, with the exception of substance use, personality, and schizophrenia spectrum disorders, where the mean age of diagnosis is close to 20 years. Disorders and symptoms often exist already during the time in RS, so RS should have resources for effective interventions before the problems become more complex.

This study confirms that there is an excess of psychiatric symptoms among the individuals with a RS background and that these problems persist also after RS, reminding about the continuous need for support in this population. Offering sufficient care for different types of disorders in good time is important and means of recognizing all types of symptoms are needed. Especially among RS

males, depressive symptoms are typically covered by externalizing behavior and stay unnoticed and untreated (Manninen et al., 2010).

Because the prevalence rates found in this study are based on knowledge from only specialized health care, they cannot be applied to milder mental health problems treated in general practitioner or not diagnosed at all. In Finnish general population, most common mental health disorders are affective and substance use disorders (Merikangas et al., 2010; Pirkola et al., 2005). In the part of the RS population with no specialized health care diagnoses, the distribution of diagnoses may resemble more the general population rates than the distribution suggested by this study. Anxiety and eating disorders were left out of the study data because reliable classification was not possible, so the results of this study do not cover prevalence rates of these disorders.

This is the first study of its kind: a register-based follow-up regarding RS individuals' psychiatric morbidity. Strengths of this study include a long follow-up time and a representative sample with five full cohorts from a time interval of twenty years. As a register study, this study has no drop-outs, but it is likely that some of the included individuals who suffer from a psychiatric condition have not received a diagnosis, and the rates found in this study are likely to be underestimates of the reality. Especially individuals with substance use disorders are under a high risk of drop out from treatment network (Brorson, Ajo Arnevik, Rand-Hendriksen, & Duckert, 2013). The hazard ratios between RS and general population groups are still informative, as the high treatment drop-out risk in many of the disorders applies similarly to individuals with and without RS background. Despite these limitations, it is presumable that the hazard ratios between these groups are proportional to the actual differences between these groups.

In the RS population, many kinds of risk factors and problems cumulate early in life. Effective screening and intervention methods are important during this group's childhood and adolescence to prevent difficulties from becoming more complicated. RS is the last possibility for intervention before adulthood. A wide spectrum of intervention methods is needed because some of the RS individuals show a weak response to traditional psychological counselling. Also different kinds of treatments after RS are important and they should be easy to reach in order to maintain the positive effects of the child welfare system.

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Supplement: information on diagnosis categories in the study data

ICD-diagnoses included in the diagnosis categories

	ICD-10	ICD-9	ICD-8
CD and ADHD	F90*-F92*	3138A 3140B 3141A 3120A	308,99
Substance use disorders	F10-F19	291* 292* 303* 304* 305*	291* 303* 304*
Affective disorders	F30-F39	2961-2968 3004A	296* 298,00 300,41
Personality disorders	F60-F69	301*	301*
Schizophrenia spectrum disorders	F20-F29	295* 297* 3012C	295* 297* 298,10 298,20 298,30 298,99 299,99 301,20
Mental retardation	F70-F79	3170A,B 3180A,B 3181A,B 3182A,B 3199A,B	310* - 315*
Disorders of psychological development	F80-F89	315* 299*	306,10
Other childhood disorders	F93-F98	3132C 3133A 3138B 3138C 3138X	306,20 306,30 306,50 306,60 306,00

Abbreviations: ICD-10/9/8 = International Classification of Diseases, versions 10, 9 and 8;

CD = Conduct disorder

ADHD = Attention deficit hyperactivity disorder

* = any fourth and fifth digits/numbers included