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Childhood adversity, psychopathology, and quality of life among adolescents in residential youth care

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Norwegian University of
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Doctoral thesis

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NORSK SAMMENDRAG

Ungdom i risiko: Overgrepserfaringer, psykopatologi og livskvalitet blant ungdom i barnevernsinstitusjoner

Overgrep og omsorgssvikt i barndommen er assosiert med en rekke fysiske og psykiske helseplager senere i livet. Å kunne identifisere risikoutsatte befolkningsgrupper er svært verdifullt med tanke på å kunne forebygge helseplager. Barn og unge i fosterhjem og på barnevernsinstitusjoner har opplevd mer overgrep og omsorgssvikt enn barn og unge i normalbefolkningen, og kan derfor være i en høy-risikogruppe for helseproblemer.

Hovedmålet med denne studien var å studere om overgrepserfaringer var assosiert med psykiske lidelser og redusert livskvalitet også i en høy-risikogruppe av ungdom bosatt i barnevernsinstitusjoner. Et sekundært mål var å forsøke å identifisere medierende faktorer som kunne øke kunnskapen om disse assosiasjonene ytterligere.

Prosjektet er en del av studien *«Psykisk helse hos barn og unge i barnevernsinstitusjoner»* som ble gjennomført mellom 2010 og 2015. 400 ungdommer mellom 12 og 20 år bosatt i barnevernsinstitusjoner i Norge ble inkludert, og av disse gjennomførte 335 et semi-strukturert diagnostisk intervju som i tillegg til informasjon om psykiske lidelser også ga informasjon om overgrepserfaringer.

En stor andel av ungdommene (71 %) oppga å ha overgrepserfaringer (å ha vært vitne til vold, å ha vært utsatt for fysiske eller seksuelle overgrep). I denne gruppa var det høyere forekomst av en rekke psykiske sykdommer sammenlignet med de andre ungdommene i barnevernsinstitusjonene. Det var statistisk signifikant forskjell i forekomst av alvorlig depresjon, dystymi, generalisert angstlidelse, alvorlig atferdsforstyrrelse og autismespekterforstyrrelse mellom de to ungdomsgruppene. I tillegg var det signifikant økt forekomst av tidligere selvmordsforsøk blant ungdommene med overgrepserfaringer. Denne gruppen ungdommer hadde også dårligere livskvalitet enn ungdom i normalbefolkningen i forhold til fysisk og emosjonelt velvære, selvtillit og i forholdet til venner. Økende antall ulike typer overgrepserfaringer inkludert dysfunksjonelle familieforhold, var assosiert med økt odds for flere av de psykiatriske diagnosene, og for dårligere livskvalitet på alle undersøkte livsområder. Tre potensielle medierende faktorer ble undersøkt: globalt selvbilde, tilknytningsproblemer og bruk av tobakk/rusmidler. Av disse ble det funnet at kun globalt selvbilde hadde medierende effekt både på assosiasjonen mellom overgrepserfaringer og psykopatologi, og overgrepserfaringer og livskvalitet.

Unge i barnevernsinstitusjoner hadde opplevd en rekke overgrepserfaringer. Resultatene fra denne studien indikerer at overgrepserfaringer spiller en nøkkelrolle i utviklingen av psykiske lidelser og utviklingen av dårlig livskvalitet blant ungdom i barnevernsinstitusjoner. Global selvfølelse ble identifisert som en mediator, og kan derfor være et velegnet angrepspunkt for intervensjon innenfor denne ungdomsgruppa. Studien åpner for muligheten av at tiltak som øker selvbildet kan forebygge den negative helseutviklingen de er i høy risiko for.

Navn kandidat: Hanne Klæboe Greger
Institutt: Regionalt kunnskapssenter for barn og unge - psykisk helse og barnevern (RKBU Midt-Norge), Institutt for psykisk helse, Fakultet for medisin og helsevitenskap
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ENGLISH ABSTRACT

Youth at risk: Childhood adversity, psychopathology, and quality of life among adolescents in residential youth care

Childhood adversity is associated with a wide variety of somatic and mental health problems during adolescence and adulthood. Identifying high-risk populations would be valuable as a means of preventing later health problems. Children and adolescents in foster or residential care have experienced more childhood adversity than the general population and may therefore be at increased risk of health problems.

The main aim of this study was to investigate whether childhood adversity was associated with any psychiatric diagnoses and quality of life measures in a high-risk population of adolescents in residential youth care. A secondary additional aim was to identify any mediators of these associations that might expand knowledge on this topic.

This study is part of a larger project *"Mental health in children and adolescents in child welfare institutions"* that was conducted from 2010 to 2015. In this project, 400 adolescents aged 12–20 years living in residential youth care (RYC) were included. Of these, 335 completed a semi-structured psychiatric interview that provided information about psychiatric disorders and childhood adversities.

A high proportion of the adolescents (71%) had been exposed to maltreatment such as witnessing violence or being a victim of physical or sexual abuse. In this group, the prevalence of several psychiatric disorders was higher than that in non-maltreated adolescents in RYC. There were significant differences in the prevalence of major depressive disorder, dysthymia, generalized anxiety disorder, conduct disorder, and autism spectrum disorder between these groups of adolescents. The prevalence of having attempted suicide was significantly higher in the adolescents who had been maltreated. This group of adolescents also had a significantly poorer self-reported quality of life score in the domains of physical well-being, emotional well-being, self-esteem, and relationships with friends compared with the general adolescent population. Having been exposed to several types of childhood adversity (e.g., witnessing violence, being a victim of physical family violence or a victim of sexual abuse, household dysfunction) increased the odds of having several psychiatric disorders and poorer quality of life scores for all five subdomains studied.

Three potential mediators of these associations were studied: global self-esteem, attachment difficulties, and substance use. Global self-esteem, a general perception of self and of how much the individual likes oneself as a person, was the only factor that appeared to be a mediator of both the associations between childhood adversity and psychopathology, and between childhood adversity and quality of life.

The adolescents in RYC had experienced many childhood adversities. The results indicate that childhood adversity plays a key role regarding both mental health problems and poor quality of life in adolescents in RYC. Global self-esteem was identified as a mediator and may therefore be a potential target for interventions. Improving global self-esteem may prevent adolescents from entering this negative pathway.

CONTENTS

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… there are more important things in life than mushrooms… (Morkel, The Moss)

 (I Morgentåkedalen, Jan Deberitz)

LIST OF PAPERS

Paper I: Greger HK, Myhre AK, Lydersen S, Jozefiak T. **Previous maltreatment and present mental health in a high-risk adolescent population.** *Child Abuse & Neglect* 45 (2015) pp. 122–134

Paper II: Greger HK, Myhre AK, Lydersen S, Jozefiak T. **Child maltreatment and quality of life: a study of adolescents in residential care.** *Health and Quality of Life Outcomes* (2016) 14:74

Paper III: Greger HK, Myhre AK, Klöckner CA, Jozefiak T. **Childhood adversities, psychopathology and well-being: the mediator role of global self-esteem, attachment difficulties and substance use.** (Submitted)

ABBREVIATIONS

ACE	Adverse childhood experiences
ADHD	Attention deficit/hyperactivity disorder
AS	Asperger syndrome
ASD	Autism spectrum disorder
CAP	Child and adolescent psychiatry
CAPA	Child and adolescent psychiatric assessment
CBCL	The Child behaviour checklist
CD	Conduct disorder
CI	Confidence interval
CWS	Child welfare service
DSM	Diagnostic and statistical manual of mental disorders
GAD	Generalized anxiety disorder
HPA	Hypothalamus-pituitary-adrenal
ICD	International classification of diseases
JVQ	Juvenile victimization questionnaire
KINDL-R	Questionnaire for measuring health-related quality of life in children and adolescents, revised version
MACE	Maltreatment and abuse chronology of exposure
MDD	Major depressive disorder
OR	Odds ratio

PFC	Prefrontal cortex
PTSD	Post-traumatic stress disorder
QoL	Quality of life
RAD	Reactive attachment disorder
RYC	Residential youth care
SES	Socioeconomic status
SPPA	Self-perception profile for adolescents
WHO	World health organization

KEY CONCEPTS

Adversity, maltreatment, and victimization

There is no universal definition of adversity and maltreatment and, in the literature, these terms are used inconsistently and interchangeably. When referring to the results of this thesis, the term "adversity" is defined as "witnessing violence, being a victim of physical violence by a family member, being a victim of sexual abuse, or experiencing household dysfunction". This was denoted as "victimization" in paper 1, "adversity" in paper 2, and "maltreatment" in paper 3. In this thesis and in papers 1 and 2, maltreatment is defined as "witnessing violence, being a victim of physical violence by a family or non-family member, or being a victim of sexual abuse".

Household dysfunction

Household dysfunction is defined as "parents with psychiatric problems, parents with alcohol or drug abuse, or parental criminality".

Poly-victimization

Poly-victimization is used as a term to describe exposure to more than one type of childhood adversity.

Quality of life and well-being

Quality of life can be defined as the individual's subjectively perceived well-being and satisfaction with life according to his/her own experience in different life domains. In paper 2, QoL was operationalized using five subscales of the Kinder Lebensqualität Fragebogen (Questionnaire for Measuring Health-related Quality of Life in Children and Adolescents, revised version) to assess physical well-being, emotional well-being, self-esteem, friends, and school. In paper 3, well-being was operationalized using three of these subscales to assess physical well-being, emotional well-being, and friends.

Residential youth care

Residential youth care is provided in facilities in which, under the child welfare system, children and adolescents are placed when out-of-home care is necessary and foster home placement is not an option.

Mediator

A mediating model seeks to explain mechanisms underlying the observed relationships between two variables through inclusion of a third hypothetical variable (mediator).

Global self-esteem

Self-esteem is a subjective evaluation of what an individual thinks of him/herself and can be divided into two categories. One category embraces the individual's evaluation of his/her own competence in specific life domains such as athletic appearance, romantic appeal, academic achievement, etc. Global self-esteem comprises a general perception of oneself—how much an individual likes him/herself as a person and a sense of one's own worth as a person.

Psychopathology

The term "mental health" has a positive value, and the term "psychopathology" refers to the study of mental illness. In this thesis, psychopathology refers to psychiatric symptoms, symptom clusters, and disorders. The term "mental health problems" is used synonymously with "psychopathology".

1. INTRODUCTION

Topic of the thesis

The aim of this thesis is to examine the relationship between childhood adversity, psychopathology and quality of life (QoL) in a high-risk population of adolescents in residential youth care (RYC).

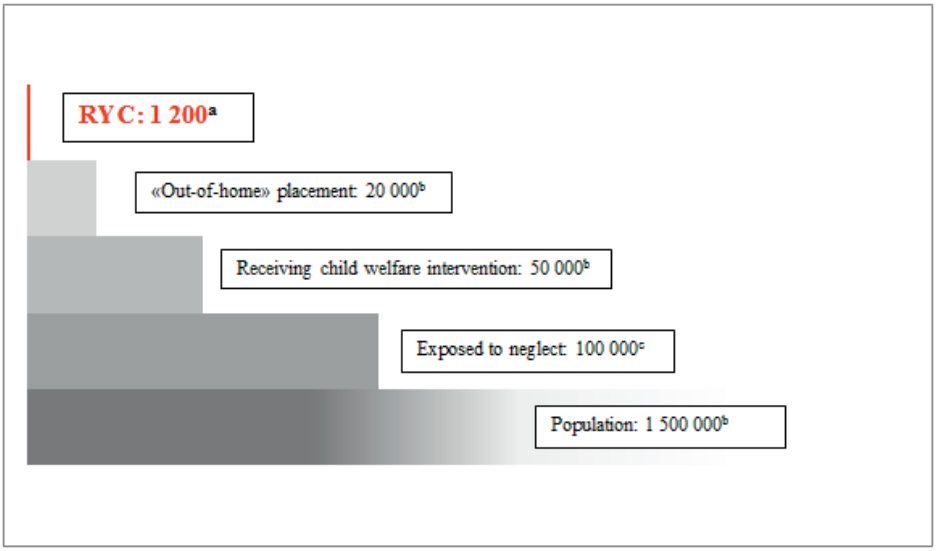
1.1 Rationale of the thesis

1.1.1 Adolescents in residential youth care

In a report evaluating the impact of the Norwegian child welfare service (CWS) reform from 2004 on RYC institutions, Backe-Hansen et al. describe present (2011) knowledge about residents in RYC (1). They stress that there is a non-random selection process of children and adolescents into RYC. Although the reasons for CWS interventions in most new cases include circumstances in the home such as neglect, maltreatment, or parental problems with drugs or alcohol, or psychiatric illness, some of the main reasons registered for RYC placement are adolescent behavioral and drug problems. However, an important principle in CWS work is that out-of-home placement is considered only when other interventions have proved unsatisfactory. Foster home placement is to be preferred to RYC whenever possible (1). It is therefore a reasonable assumption that all adolescents in RYC, at least in Norway, are a highly selected group, and that they have experienced more adversities than has the average adolescent in the general population (see Figure 1). They have all been removed from their biological family, and many of them have experienced several foster home placements before RYC (2). Thereby, these adolescents have experienced more broken relationships than have many adults.

Although the most common reason for RYC placement might be adolescent behavioral or drug problems, the reason for the initial CWS contact years before might have been circumstances in the home such as neglect, maltreatment, or parental problems with drugs or alcohol, or psychiatric illness. From the socioeconomic perspective, these adolescents represent a challenging group. Studies have shown that adolescents and adults with a history of child welfare involvement are marginalized and that those who have been in RYC are marginalized more than are those who have received other interventions. Those who have a

history of child welfare involvement have a lower educational level and lower secondary school grades as students and, as adults, have higher rates of unemployment, receive more social welfare benefits and have a lower mean income compared with adults without a child welfare history (3). Low average secondary school grades are the strongest predictor of high school failure (4). However, there is sparse research concerning this highly selected and high-risk group of adolescents.



Note. [a] *Numbers retrieved from Statistics Norway, including children and adolescents in acute placement.*
[b] *Numbers retrieved from Statistics Norway.*
[c] *Estimated numbers based on the results in the report "*Violence and rape in adolescence: a national interview survey of 16- and 17-year-olds" (5)

Figure 1. Overview of the population aged 0–22 years in Norway, rough estimates

1.1.2 High-risk populations

Previous research has identified certain population groups at increased risk of mental health problems, poor QoL and exposure to childhood adversity (6-9). A high prevalence of mental health problems is found among youth in the juvenile justice system (6, 10, 11), homeless

youth (9, 12) and children and adolescents in foster care or RYC (8, 13-16). Adults with a CWS history are also overrepresented in groups receiving medical benefits and have a higher mortality rate (mainly caused by suicide, drug abuse, poisoning and accidents) than do young adults without a CWS history (3). Lehmann et al. studied 396 children aged 6–12 years in foster care in Norway and found that 50.9% met the criteria for at least one diagnosis according the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV). Exposure to violence, serious neglect and number of out-of-home placements were identified as risk factors (17). Poor QoL is associated with low socioeconomic status (SES), poor mental health and medical conditions (18-20). Results from the project *"Mental health in children and adolescents in child welfare institutions"* show that adolescents in Norwegian RYC have a high rate (76.2%) of psychiatric disorders (2) and poor QoL (21). However, these studies did not investigate the relationships between childhood adversity, psychopathology, and QoL among adolescents in RYC.

1.2 Organization of the child welfare system in Norway

The Ministry for Children, Equality and Social Inclusion has overall responsibility for CWS in Norway, but both the local and central authorities have duties and responsibilities in the field. All municipalities must have a CWS that is responsible for the day-to-day work (22). The primary aim of the CWS is to ensure that children and adolescents living under conditions that might represent a risk to their health or development are provided with the necessary assistance and care. The main part of CWS work comprises voluntary interventions in the home, such as guidance, kindergarten access, or access to a respite home. Reports of children at risk are investigated by the local CWS, which prepares an interim care order case to the county social welfare board, which is an independent and impartial decision-making body. The county social welfare board may decide that the CWS should assume the care of a child if the child is subjected to serious neglect and it is considered necessary and beneficial to the child. Usually, foster home placement is the preferred choice when out-of-home care is needed, and RYC will be the last resort (1). Therefore, many of the residents will have experienced disrupted foster home placements, which place them at increased risk of mental health problems (23, 24).

RYC institutions in Norway are organized by the Norwegian Directorate for Children, Youth and Family under the Ministry of Children, Equality and Social Inclusion. The directorate is responsible for all RYC institutions, but the institutions can be both publicly and privately owned. A Norwegian RYC institution is typically a small unit resembling the home environment where young people are encouraged to live as close to a normal life as possible by attending school and participating in leisure activities. The intention is that the adolescents stay for as short a time as possible; however, for some, the home situation is not acceptable for a return. At the institutions, each child is given a primary contact among the available RYC staff. The work of the staff is based on a milieu therapeutic model, and knowledge of psychiatric diagnosis and treatment are not demanded.

1.3 Childhood adversity

1.3.1 Definitions

Childhood adversity can be defined in various ways. In the Adverse Childhood Experiences (ACE) study, adversities included child abuse (physical, sexual and emotional abuse), neglect (emotional and physical) and household dysfunction (mother treated violently, household substance abuse, mental illness in the household, parental separation or divorce, or criminal household member) (25, 26). However, adolescents can be exposed to many kinds of adversities and victimization. The Maltreatment and Abuse Chronology of Exposure (MACE) instrument for retrospective assessment of abuse and neglect includes emotional neglect, nonverbal emotional abuse, parental physical maltreatment, parental verbal abuse, peer emotional abuse, peer physical bullying, physical neglect, sexual abuse, witnessing interparental violence, and witnessing violence to siblings (27). The Juvenile Victimization Questionnaire (JVQ) covers five general areas of youth victimization: conventional crime, maltreatment, victimization by peers and siblings, sexual victimization, and witnessing and indirect victimization (28). In the present thesis, child maltreatment is defined as physical abuse (by a family or non-family member), sexual abuse, and witnessing violence. Childhood adversity is defined as physical abuse from a family member, sexual abuse, witnessing violence, and household dysfunction (parental criminality, parental substance/alcohol abuse and parental mental illness).

1.3.2 Epidemiology

The prevalence of child abuse and household dysfunction varies widely between countries. In 2016, Hillis et al. published a review in which they estimated the prevalence of violence in the past year against children aged 2–17 years across countries and world regions (29). The minimum estimate was that 12% of children in Europe had been exposed to physical violence, emotional violence, sexual violence, bullying, or witnessing violence in the past year. This contrasts with 56% of children in Northern America (Canada, Greenland and USA) and 64% of children in Asia. In a report based on interviews with 2062 adolescents aged 16–17 years in Norway, Myhre et al. found that 8.5% had been exposed to neglect, 3% had witnessed parental violence, 1.7% had been exposed to severe physical abuse from parents, and 13.3% of girls and 3.7% of boys had been exposed to any kind of sexual abuse (5). Among victimized children and youth, multiple victimizations are common, and there is considerable overlap between different types of adversities (30-33).

1.3.3 Childhood adversity and psychopathology

The ACE study was one of the first large studies to document associations between childhood adversity and later psychiatric and physical diseases and problems (26, 33). International research groups have found relationships between childhood adversity and later depression, anxiety, posttraumatic stress disorder (PTSD), eating disorders, sleep disorders, substance abuse, behavioral disorders, suicide ideation, and self-harm (34-39). These results are shown to be strong and robust, and have been confirmed by systematic reviews and meta-analyses that included several million participants across different world regions (40-42).

A growing literature shows that poly-victimization (exposure to more than one type of victimization) further increases the risk of several psychiatric disorders and symptoms, such as depression, anxiety, PTSD, suicide ideation, and self-harm (34, 43-47). It has also been shown that increasing numbers of childhood adversities are associated with more complex adult psychopathology, including more DSM-IV diagnoses and the coexistence of internalizing and externalizing disorders (48). In a study of young adults aged 20–24 years in Sweden, Cater et al. found that anxiety, posttraumatic stress, and criminal behavior were related to any kind of victimization. They also reported that poly-victimization was related to increased risk of depression, anxiety, suicide ideation, self-harm, criminality, risky alcohol use, and posttraumatic stress (49). In a Danish study of 6200 ninth graders (aged 15-16 years), Helweg-Larsen et al. found that exposure to mild or severe physical violence was associated

with anxiety and depression. However, there were some sex differences, and violence outside the home was found to be a stronger risk factor than exposure to violence at home for girls compared with boys (50).

1.4 Psychiatric disorders in childhood and adolescence

Psychiatric disorders are classified by two main nosological systems: the DSM and the International Classification of Diseases (ICD). The ICD is most commonly used among clinicians in Europe, Asia and Africa, and the DSM is used most often internationally in both clinical and research settings (51). Through extensive revisions of the first version in 1952, the focus of the DSM has moved away from explaining the etiology of particular disorders to specifically describing symptoms of the disorders to increase the reliability of the diagnoses (51). Although the ICD and DSM differ in the diagnostic criteria of some mental disorders, both systems are built on an intention to formally define and categorize mental disorders.

The developmental path from early childhood through adolescence into adulthood is characterized by huge changes and transitions in biological, psychosocial, cognitive, and emotional abilities and demands. The prevalence rates of psychiatric disorders vary considerably through childhood, adolescence and adulthood (52, 53). The National Comorbidity Survey Replication – Adolescent Supplement survey included 10 123 adolescents age 13–18 years and reported that the median age of onset of psychiatric disorders varied according to the disorder: 6 years for anxiety, 11 years for behavioral disorders, 13 years for mood disorders, and 15 years for substance use disorders (54). Problems in early childhood are dominated by disturbances in sleep, behavior, attention, and control over body functions. During adolescence, the prevalence of depression, panic disorder, conduct disorder and substance use disorders increase, and the transition into adulthood shows a further increase in the prevalence of panic disorder, substance use disorders, eating disorders, and a decrease in behavior disorders (52).

1.4.1 Epidemiology

The Norwegian Institute of Public Health estimates that at any time, 15–20% of all children and adolescents in Norway aged 3–18 years have decreased functioning because of mental health problems. The total prevalence of psychiatric disorders, including impairment, among children and adolescents in the general population in Norway is estimated to be about 8% (55-

57). In a study of Norwegian 4-year-olds, Wichstrøm et al. found a prevalence of psychiatric disorders of 7.1% (excluding encopresis) (56). The prevalence of behavioral disorders (3.5%) and emotional disorders (3.3%) was balanced, but with a high rate of comorbidity between the disorder categories. In a recent study from Denmark, Elberling et al. found a total prevalence of any ICD-10 psychiatric disorder of 5.7% among 1585 5–7-year-olds (58). A study of Norwegian 8–10-year-olds found a similar total prevalence of psychiatric disorders of 7% (55). These prevalence rates are lower than those reported from other countries. For example, Egger et al. reported a prevalence of psychiatric disorders of 16.2% among US preschoolers (59). In a large study of 3585 6-year-olds in Brazil, Petresco et al. reported that nearly 13% of the children had received a psychiatric diagnosis according to the DSM-IV, with anxiety disorder the most prevalent (60).

From childhood to adolescence, there is an increase in the rates of emotional and substance use disorders (52). The total prevalence of psychiatric disorders in the Norwegian adolescent population has not been studied extensively. However, Sund et al. found a prevalence of any current depression (major depressive disorder (MDD), dysthymia or depression not otherwise specified) of 9.4% among Norwegian adolescents aged 13–17 years (61). In a large study of 7639 adolescents aged 13–18 years in Norway, Skrove et al. found that 13% of the participants reported symptoms of anxiety and depression (62). In the British Child and Adolescent Mental Health Survey, Ford et al. found a prevalence of psychiatric disorders according to DSM-IV of 12.3% among young adolescents aged 13–15 years (53). The prevalence rates of any depressive disorder were 2.5%, any anxiety disorder 5.0%, and conduct disorder (CD) 3.3%, which were significantly higher than those among the younger age groups. Ravens-Sieberer et al. reported variability in the prevalence rates of mental health problems among children and adolescents aged 8–18 years across 12 European countries from 2.9% in Germany to 10.4% in the United Kingdom when assessed as the total abnormal score measured by the Strength and Difficulties Questionnaire (20).

1.4.2 Developmental trauma disorder – complex posttraumatic stress disorder

PTSD as a diagnosis was established and incorporated in DSM-II in 1980 to encompass patterns of symptoms and dysfunction following a single traumatic event (63). The criteria are based on research in adults, but some modifications were made later to adjust them to children and adolescents. However, some studies have shown that even though children and

adolescents might not express the full symptom criteria of PTSD, a "partial PTSD" can still be clinically significant because of impaired daily life function. In a Dutch study, Jonkman et al. reported that PTSD and trauma-related symptoms were more severe among children after a single trauma than after maltreatment exposure (64). They also found that trauma-unrelated symptoms were more severe and diverse in maltreated children compared with children exposed to a single trauma. In a study of young adults (mean age 19.4 years) who survived the Utøya terrorist attack in Norway in 2011, Dyb et al. found that 11% met the clinical criteria of PTSD and an additional 36% suffered "partial PTSD" by meeting the symptom criteria for two of three subcategories of PTSD symptoms (65). Irwanto et al. found that 5 years after the tsunami in Southeast Asia, 20.6% of children aged 6–13 years met the clinical criteria of PTSD (66).

A traumatic childhood characterized by physical abuse, sexual abuse or emotional abuse is fundamentally different from one involving a single traumatic event such as a terrorist attack or natural disaster. Childhood maltreatment is more complex, repetitive and long lasting, and can affect social relationships. Exposure to multiple types of maltreatment is common, and from a developmental perspective, the timing and severity of maltreatment are important (67). In 2009, van der Kolk et al. proposed the inclusion of a new diagnosis in the revision of the DSM-IV as "developmental trauma disorder" (DTD) (68). To address the developmental aspects of symptoms in traumatized children, three symptom clusters were included in addition to the defined symptoms of PTSD: symptoms of emotional and physiological dysregulation/dissociation, problems with conduct and attention regulation, and difficulties with self-esteem regulation and in managing social connections. The diagnosis was not accepted at the time of the revision and is the topic of discussion in the field of childhood maltreatment (69).

A parallel process to the DSM revision has evolved regarding the revision of the ICD-10. In 2013, Maercker et al. published a proposal for stress-related disorders in the ICD-11 and proposed complex PTSD (CPTSD) as a new category (70). This proposed diagnosis is reserved for extensive reactions typically following severe, prolonged, and repeated adverse events. In addition to the three core elements of PTSD (re-experiencing the traumatic event, avoidance of reminders and a heightened perception about a current threat), CPTSD includes enduring disturbances in the domains of affect, self-concept and interpersonal relationships (70, 71). The proposed revision of the ICD acknowledges that traumatic events can differ by

developmental stage and include descriptions of age-related symptoms for children and adolescents (71).

Recent studies support a distinction between CPTSD and PTSD. In an intervention study of 155 children aged 7–17 years in Scotland, Sachser et al. reported empirical evidence of a distinction between CPTSD and PTSD and that young people experiencing either responded to trauma-focused cognitive behavioral therapy with improvement of symptoms (72). In a study of 314 young adults in Uganda, 40% of whom were former child soldiers, Murphy et al. also found support for the proposed distinction between PTSD and CPTSD (73). An introduction of CPTSD into the ICD-11 would conflict with the traditional diagnostic systems on constraining the description of symptoms. However, it could contribute to recognition of observed symptoms in severely traumatized children, provide an explanation for comorbidity, enable effective treatment for comorbid disorders and enhance research (69).

1.5 Quality of life in childhood and adolescence

1.5.1 Definitions

At present, there is no uniform definition of the concept of QoL. The World Health Organization (WHO) defines QoL as "*individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns*" (74). In children and adolescents, this includes the child's own experiences across several life domains. The WHO highlights that the concept of QoL is subjective and multidimensional and, therefore, self-reports are the gold standard of QoL assessment.

QoL research can take different directions, and these are reflected in the choice of instrument in individual studies. Although there are numerous definitions of QoL, they all include physical, psychological, and social aspects or domains of life. The Kinder Lebensqualität Fragebogen (Questionnaire for Measuring Health-related Quality of Life in Children and Adolescents, revised version) (KINDL-R) questionnaire used in this thesis includes physical and emotional well-being, self-esteem, and relationships with family, friends, and school (75). However, self-esteem is not universally accepted as a dimension of QoL. Other instruments that are frequently used in research of child and adolescent QoL, such as the Inventory of Life

Quality in Children and Adolescents (ILC) (76) and the Measurement Model for the Pediatric Quality of Life Inventory (PedsQL) (77), do not include self-esteem. Therefore, there is no universal agreement about whether self-esteem should be included as a conceptual part of QoL or viewed as a separate construct.

1.5.2 Epidemiology

As defined, QoL is related and complementary, but not restricted, to an individual's physical and psychiatric health status. The concept has gained increasing interest in research in the past decades. However, with some exceptions, most research has focused on QoL of selected subgroups, mainly those with somatic conditions, rather than samples of children and adolescents from the general population. Generally, QoL declines with age during adolescence and lower QoL is associated with low SES, poor mental health and medical conditions (18-20). In a 6-month follow-up study of 1821 children aged 8–16 years from a Norwegian general population sample, Jozefiak et al. found age-specific differences in QoL trajectories. During early adolescence (eighth grade = 13–14 years), adolescents report a decrease in total QoL and some QoL subdomains (family and school relationships). Emotional well-being decreased over the 6-month period for all but the youngest group, but other subdomains remained stable (relationships with friends and self-esteem) (78). They also found that parents reported their children's QoL to be more positive than the children did themselves (79).

1.5.3 Childhood adversity and quality of life

Previous research on the QoL of maltreated children and adolescents is limited (80). Adult survivors of child maltreatment experience significant loss of health-related QoL and of their remaining quality-adjusted life years (81, 82). In a recent review, Weber et al. concluded that there is a consistently negative association between child maltreatment and both self- and proxy-reported QoL. They also found that the number of different types of maltreatment and QoL were negatively related, although all studies that had investigated this relationship assessed adult survivors rather than children (83). A recent study of Swedish 15-year-old school children found a dose–response relationship between the number of different types of abuse (not including sexual abuse) and decreased QoL (84). In a study of Chinese adolescents (aged 15-17 years), Chan found that youth exposed to poly-victimization reported poorer health-related QoL than their non-victimized peers (45). In a large study of high school students in Kuwait, Al-Fayez et al. reported significantly poorer QoL of students exposed to

maltreatment (85). Witt et al. studied 358 German children and adolescents aged 4–17 years with a known history of child maltreatment and found that exposure to multiple types of maltreatment was associated with poorer QoL outcome (86). Lanier et al. reported that children receiving CWS as a follow-up to a report of child abuse or neglect had significantly lower QoL scores compared with a normative reference group (87). A Swiss study of health-related QoL of young maltreated children (mean age 8 years) also reported significantly impaired QoL of maltreated children compared with matched controls (88). These studies indicate that childhood maltreatment affects QoL throughout the life course.

1.6 Pathways from childhood adversity to negative outcomes

Kendall-Tackett suggests a model of four possible pathways through which childhood adversity might influence health: behavioral, cognitive, social and emotional pathways (89). Examples of factors representing these pathways are self-esteem (cognitive pathway), attachment (emotional and cognitive pathway), and substance use and smoking (behavioral pathway). An increasing body of research in the past decades has connected childhood adversity to a broad spectrum of psychiatric and somatic diseases, and this research has encouraged efforts to increase understanding of the underlying biological mechanisms (Figure 2).

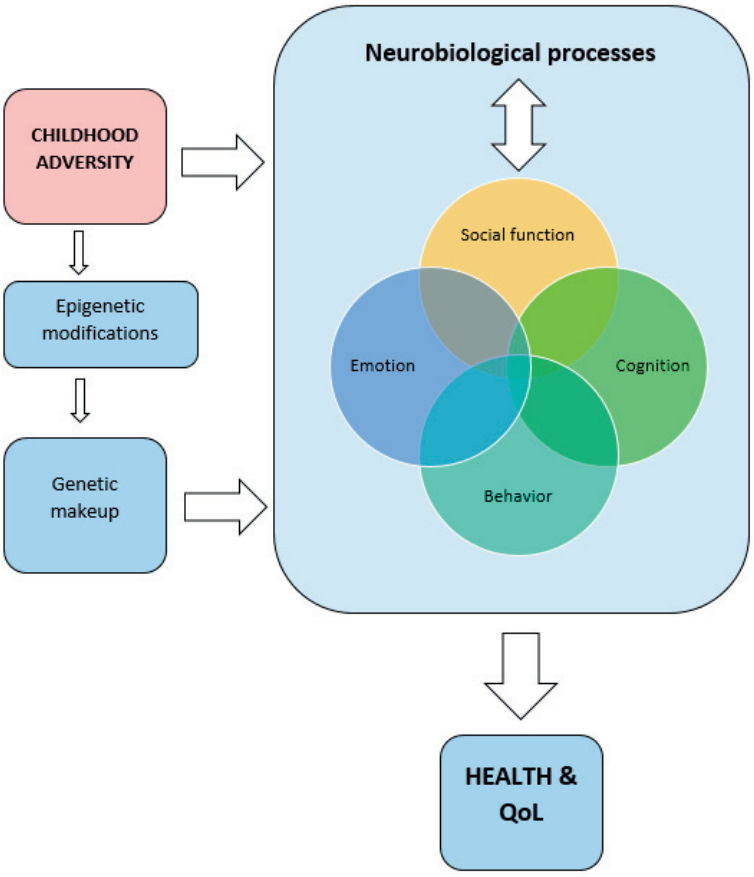


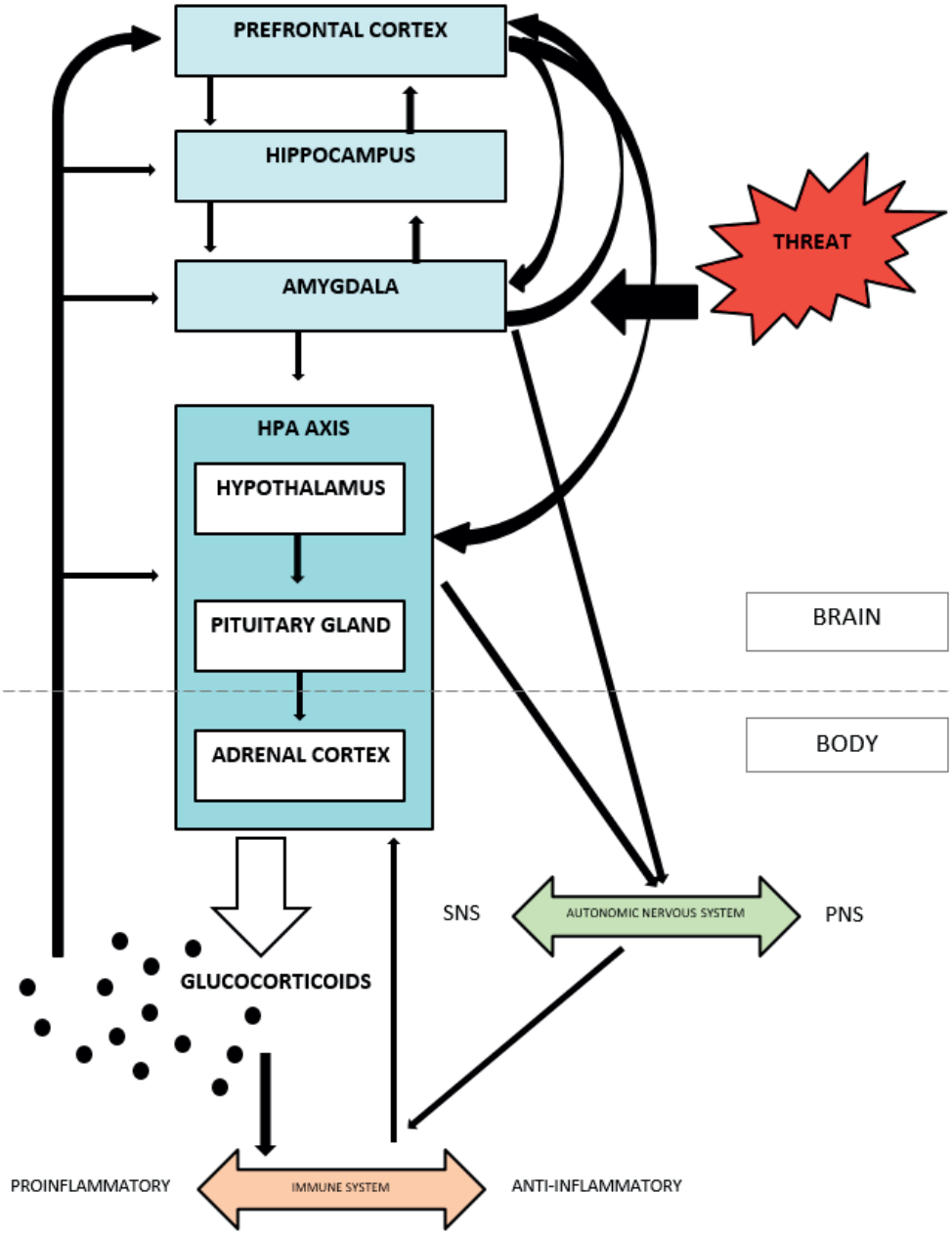
Figure 2. Pathway from childhood adversity to health and QoL

1.6.1 Neurobiological framework

There are complex interactions between environmental and individual risk and protective factors that influence the neurobiological system and direct the psychological and emotional development of children and adolescents. The amygdala, hippocampus and prefrontal cortex (PFC) are brain structures involved in the detection of threats that are central to the orchestration of the stress response. These brain structures are essential for attachment, cognitive, and executive functioning, attention, regulation of autonomic responses and emotional and somatosensory memory (90). In short, environmental stressors can trigger a

stress response in the amygdala, which in turn signals the hippocampus and the PFC, which activate the hypothalamus–pituitary–adrenal (HPA) axis, eventually resulting in the secretion of glucocorticoid hormones. The immediate stress response is normally downregulated once the threatening situation is over.

However, childhood maltreatment (such as child abuse) is often no single event (43) and, for many children, adversities are part of normal life. Chronic and increasing childhood adversities overwhelm the brain–body interaction and affect the neural, immune, and endocrine systems, which can lead to dysregulation of glucocorticoid levels, increased inflammation throughout the body and structural brain changes, such as increased amygdala volume and decreased hippocampus and PFC volume (91-93). The central nervous system can influence the immune system through its regulation of the HPA axis and the autonomic nervous system, as illustrated in Figure 3.



Note. SNS = sympathetic nervous system, PNS = parasympathetic nervous system

Figure 3. The complexity of brain–body interactions in response to a threat

There is a bidirectional communication between the HPA axis and the immune system. In general, the HPA axis, and the parasympathetic nervous system exert anti-inflammatory effects, whereas the sympathetic nervous system exerts proinflammatory effects. Glucocorticoid hormones modulate the immune response and influence the balance between proinflammatory and anti-inflammatory cytokines. Cytokines stimulate the HPA axis, and the glucocorticoid hormones produced by the HPA axis control inflammation via a negative feedback loop (94). Cortisol is a key glucocorticoid hormone involved in multiple physiological processes. Dysregulation of cortisol production can be linked to various symptoms and disorders, such as depression, the metabolic syndrome and bone loss (94). Increased inflammation is associated with a variety of somatic and psychiatric disorders that are prevalent among adult child abuse survivors, such as depression (95), cardiovascular disease (96) and diabetes (97). In addition, the suggested structural brain changes can contribute to the maintenance of trauma-focused reaction patterns that prevent healing. An amygdala with increased volume might be highly sensitive to environmental stressors, whereas a decreased hippocampus volume can limit the declarative memory, and a decreased PFC volume can limit the ability to engage cognitive resources. In addition, from the developmental perspective, the time of exposure and severity of childhood adversities also seem to have important effects on outcomes (67). However, the plasticity of the brain also makes healing processes possible.

Similar adversities will affect individuals in different ways. Whereas some individuals are resilient, others express high levels of symptoms. These differences may reflect genetic differences. There is a wide number of genetic variants that can alter the structure and function of the immune–neuroendocrine reactions to stress (98). In addition, epigenetic mechanisms, through which the expression of genetic traits can be altered in response to environmental factors, may contribute to the variability in outcomes. Childhood maltreatment can induce epigenetic modification of genes involved in the stress response systems and essential factors for brain development through methylation and may thereby be a driving force behind the development of various phenotypes of psychiatric disorders (99). Despite the need for more conclusive research, some studies have suggested that some epigenetic markers may be able to identify individuals who are resistant to pharmacological treatment of psychiatric disorders such as major depression (100, 101).

Taken together, the emerging results of research in this field contribute to the basic understanding of the brain–body processes and the neurobiological mechanisms underlying the associations between childhood adversities and negative psychiatric and somatic health outcomes.

1.6.2 The theory of latent vulnerability

McCrory and Viding introduced the theory of latent vulnerability as a way to conceptualize the increased psychiatric risk in individuals exposed to childhood maltreatment (102). The broad variety of negative health and psychosocial outcomes associated with childhood adversities indicates that the experience of maltreatment has a broad rather than focal impact on functioning. However, not all children develop psychiatric disorders or psychosocial problems following exposure to adversity. The theory of latent vulnerability suggests that a child may adapt to an adverse environment (such as maltreatment) by altering his or her neurocognitive processes, such as threat processing. In the presence of a risk genotype, a stressful environment and a few protective factors may increase the risk of the development of a psychiatric disorder over time. By contrast, a person with a resilient genotype who experiences more or stronger protective factors in the environment and a lower level of or fewer stressors will have a lower risk of developing a psychiatric disorder over time. McCrory and Viding argue that an altered threat reactivity, as indexed by an increased neural response of the amygdala to threat stimuli, is a potential latent vulnerability marker (102). Identifying a marker of latent vulnerability may provide a way to identify children at increased risk of psychiatric disorders before they develop symptoms and functional impairment, which may represent a potential means to prevent entering the risk trajectory in the most vulnerable children.

1.6.3 Self-esteem

According to Harter's theory, the self is both a cognitive and a social construction with several facets (103). The self changes over the course of a person's life. From the cognitive perspective, the construction of self by a young child is typically bound to physical appearance or skills, and is limited by his/her present cognitive development. Self-esteem or self-worth is a subjective evaluation of what an individual thinks of himself/herself and is often denoted as global self-esteem. The ability to verbalize a sense of one's own worth as a person is normally not developed until the age of 8 years. Further cognitive development can influence the individual's global self-esteem, and self-appraisal of different domains may be

integrated into the sense of self-worth. From the social perspective, different aspects of self-esteem are highly dependent on our relationships with others. Social interactions with significant others are crucial in the development of a sense of self-esteem. Young children are prone to have positive thoughts of their caregivers and, at the same time, are liable to categorize a sense of self as either "good" or "bad". Chronic child maltreatment will therefore likely influence the sense of self in a negative way. The child is likely to believe that the abusive caregiver has a "right" to maltreat and, as a result, they will most likely believe themselves to be "all bad" (103).

Several studies have confirmed the negative association between the concept of self-esteem and childhood adversity (104-106). Self-esteem has also been found to be negatively associated with psychopathology, of which depressive symptoms seem to be the most studied. The mediating role of self-esteem between victimization and psychopathology has been studied in a few general adolescent populations (107, 108). In a study of 523 adolescents aged 11–18 years, Turner et al. found that a decrease in self-esteem partially mediates the associations between the past-year sexual victimization exposure and depressive symptoms (107). In a study of 736 adolescents in Spain, Soler et al. found that self-liking (a sense of being a worthy social being) partially mediated the associations between poly-victimization and both internalizing and externalizing symptoms (108). Self-esteem has been shown to have an important effect in high-risk adolescents. Jones et al. studied 67 psychiatric inpatients aged 13–17 years and found that self-esteem mediated the association between peer victimization and suicidal ideation (109).

Self-esteem seems to have an important effect on the relationship between childhood adversity and psychopathology throughout the life course. In a study of 2402 low-income women aged 19–74 years in the US, Hill et al. found that the effect of sexual coercion before age 18 years on psychological distress is partially mediated by instrumental support and self-esteem (110). In a study of older adults (50 years and older), Sachs-Ericsson et al. found that self-esteem moderates but does not mediate the relationship between childhood abuse (physical, emotional and sexual abuse) and internalizing disorders (111). Studies have also reported associations between low self-esteem and poor QoL or well-being in general adolescent populations (112) and in adolescent and adult populations with psychiatric problems (113-115).

1.6.4 Attachment

1.6.5 Substance use Establishing a secure attachment between a child and his/her caregiver represents a primary developmental task during the first year of life. Secure attachment provides a solid base from which the child can explore his/her surroundings and contributes to neurobiological, cognitive, behavioral, and emotional development. As the child grows older, the attachment pattern continues to influence ongoing and future relationships with significant others. Childhood maltreatment, especially when the primary caregiver and offender are the same person, can be detrimental to the development of a secure attachment (116) and is a major risk factor for reactive attachment disorder (RAD) (117). Diagnosing RAD in adolescents is controversial. However, even though one of the diagnostic criteria of RAD is the presence of symptoms before the age of 5 years, subscales of RAD have been shown to be highly associated with functional impairment in a group of English high-risk adolescents (117). In a study of Japanese adolescents in RYC, Suzuki et al. found that child maltreatment affected depression through attachment styles and low self-esteem (118). In a study of 424 adults, Lowell et al. found that secure attachment with significant others (mother and peers) was associated with decreased likelihood of internalizing and externalizing problems, even in the context of childhood maltreatment (119). Thus, the effects of attachment are wide and have consequences reaching into adulthood.

Adolescence is a period characterized by physical changes, changes in emotional regulation and social relationships, and participation in risky behavior. Experimenting with tobacco, alcohol, and illicit drugs can be examples of risky behavior. However, early initiation of substance use increases risk of poly-substance use, violent behavior, anxiety, depression, suicide ideation, psychotic disorders, poor physical health, poor school performance and criminality, and is an important factor also from the global health perspective (120). Results from the ACE study show that childhood adversities are associated with early initiation of smoking and alcohol (121, 122), and that the number of childhood adversities has a strong graded relationship with the risk of drug initiation from early adolescence into adulthood and with problems with drug use, drug addiction and parenteral use (123). Shin et al. included 1019 adolescents from public service areas (alcohol and drug treatment, child welfare, juvenile justice, mental health and public school-based mental health) and found that girls who had been victims of sexual abuse were at high risk of developing poly-substance use

(124). In a Norwegian study, Mangerud et al. compared 566 adolescents from a psychiatric clinic with 8173 adolescents from the general population and found increased risk of smoking and illicit drug use among the clinical sample (125). In another Norwegian study of adolescents from the general population, the debut of alcohol and drug use was associated with symptoms of depression, inattention, and hyperactivity (126). Thus, substance use, especially early initiation, is associated with both childhood adversity and psychopathology, and might therefore act as a mediator of these associations.

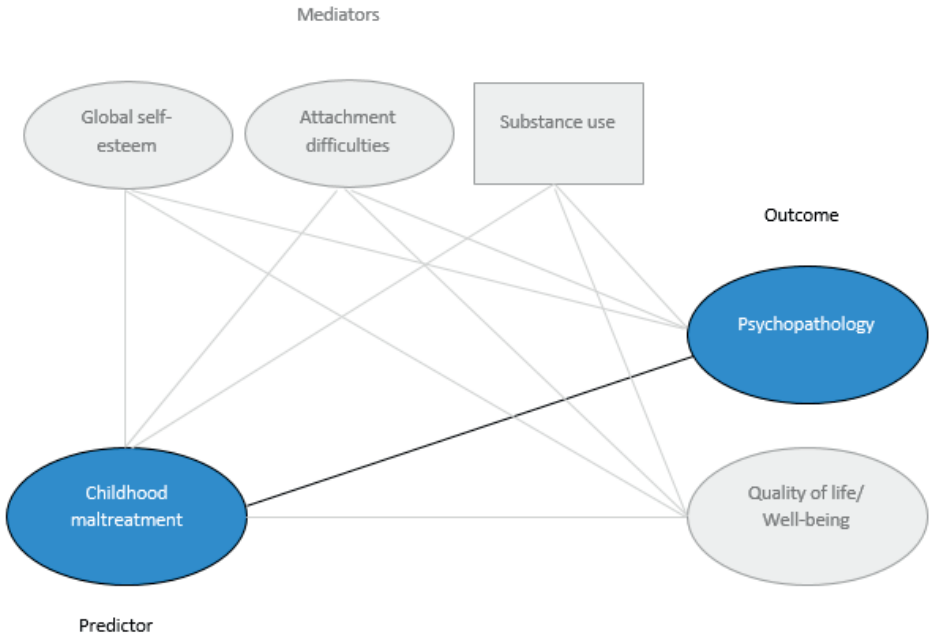
1.7 Contributions of this thesis

Research has established that childhood adversity is associated with psychopathology and poor QoL in diverse population samples. To understand more clearly the pathways to adaptive and maladaptive development, there is a need for knowledge about how the developmental processes contribute to resilience and dysfunction in high-risk populations. This understanding is essential to creating effective prevention, intervention, and treatment strategies. Most studies have focused on the associations between childhood adversity and psychopathology; less is known about high-risk populations such as adolescents in RYC, and even less about the association between childhood adversity and QoL. In addition, no studies have explored the pathways or mechanisms underlying the relationships between childhood adversity, psychopathology, and QoL among adolescents in RYC. The findings of this thesis will contribute to broadening the knowledge base of these important topics.

2. AIMS OF THE THESIS

The overall aims of this thesis were to explore the associations between childhood maltreatment/adversities and psychopathology/QoL in a high-risk adolescent population of youth living in RYC.

The following specific research objectives were addressed in the three papers of the thesis:



Note. In this and the following figures, straight lines without arrows refer to the models of the three studies to avoid misinterpretations regarding causality. However, the terms "predictor" and "outcome" are intended to illustrate the handling of the variables in the statistical analyses.

Figure 4. Model used in Paper 1

Paper 1: The main objective of this study was to explore the impact of subjective experienced maltreatment on the prevalence and comorbidity of psychiatric disorders in a high-risk adolescent population. The cumulative effect of the number of types of childhood adversities, including household dysfunction, was also studied in a population in which *all* participants had a baseline of broken relationships and experiences of adverse family functioning.

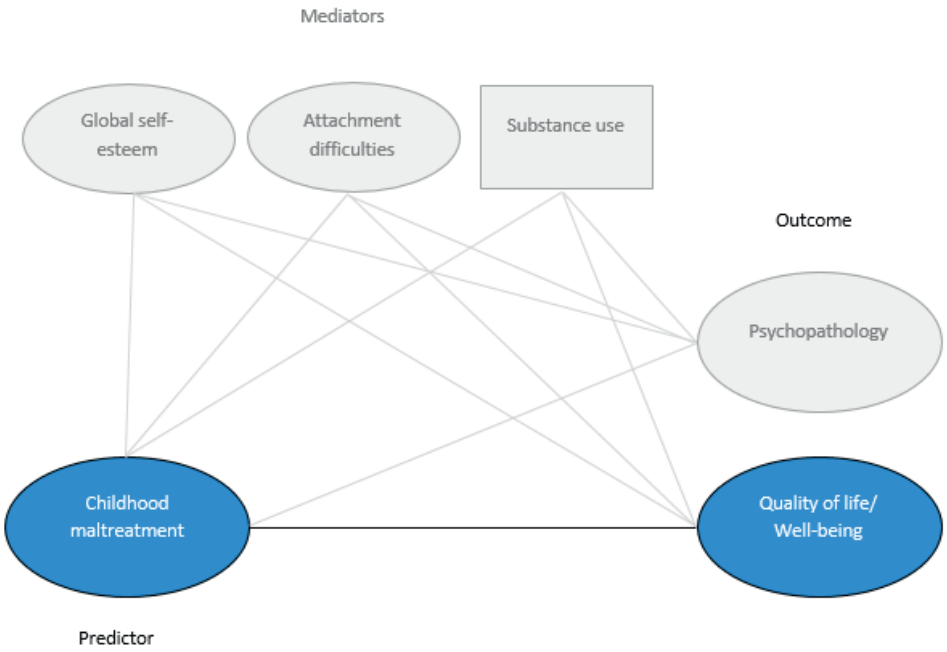


Figure 5. Model used in Paper 2

Paper 2: The primary aims of this study were to examine the QoL of adolescents in RYC units who have reported previous experience of maltreatment and to compare them with adolescents in the same RYC units without this experience and with adolescents from the general population. A secondary aim was to study the impact of the number of types of childhood adversities on QoL scores for different subdomains. In addition to adolescent self-reports, proxy reports by primary contacts were assessed as a supplement.

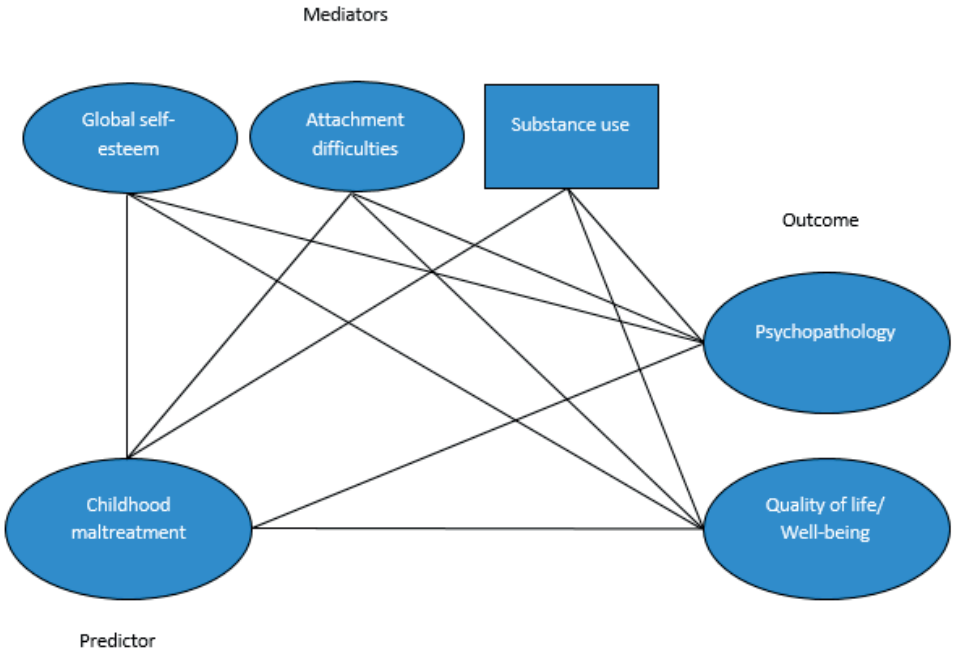


Figure 6. Model used in Paper 3

Paper 3: The primary aim of this study was to explore the mechanisms underlying the associations between childhood maltreatment and psychopathology and well-being by studying global self-esteem, attachment difficulties, and substance use as possible mediating factors of these associations.

3. METHODS

3.1 Participants

The data for this thesis were obtained from the Norwegian research project *"Mental health in children and adolescents in child welfare institutions"* (2, 166). This was a cross-sectional study of adolescents in RYC in Norway. All residential care units providing care for adolescents aged 12–23 years in Norway were invited to participate in the study. The exclusion criteria were unaccompanied minors without asylum in Norway, adolescents on acute placement, and insufficient Norwegian language ability. A total of 86 of the 98 invited institutions agreed to participate in the study, and 400 of the 601 eligible adolescents participated, giving a response rate of 67%. There were no eligible adolescents older than 20 years, and the final age range was 12–20 years. The participants' characteristics are presented in Table 1 in Paper 1, and the flow chart for inclusion is shown in Figure 7 (2).

In Paper 2, a general population sample was used as a comparison group. This was a study sample of students aged 9–17 years from schools in Sør-Trøndelag county. Data were collected in 2004–2005, and 1997 students were included, giving a response rate of 71.2%. For the present comparison group, only participants aged 12 years and older were included, resulting in a sample of 1017 individuals. Students and their parents completed the KINDL-R (see below) independently. For further details, see Jozefiak et al. (79).

3.2 Procedures

Data collection was conducted by research assistants who visited the institutions and completed semi-structured psychiatric interviews with the adolescents and their primary contacts, and collected the questionnaires from the adolescents, their primary contacts, and the leaders of the institutions. The primary contact was the member of the milieu therapeutic staff who was assigned as the person with the best knowledge of and most contact with each individual adolescent. Four trained interviewers were used; they had been educated in relevant fields (2 with a master's degree in psychology/social work, 1with a bachelor's degree in mental health, and a nurse who specialized in mental health) and had extensive prior experience working with children and families. During the entire period of data collection, a

team of child and adolescent psychiatrists and psychologists was on call in case of emergencies. Data were collected from June 2011 until July 2014.

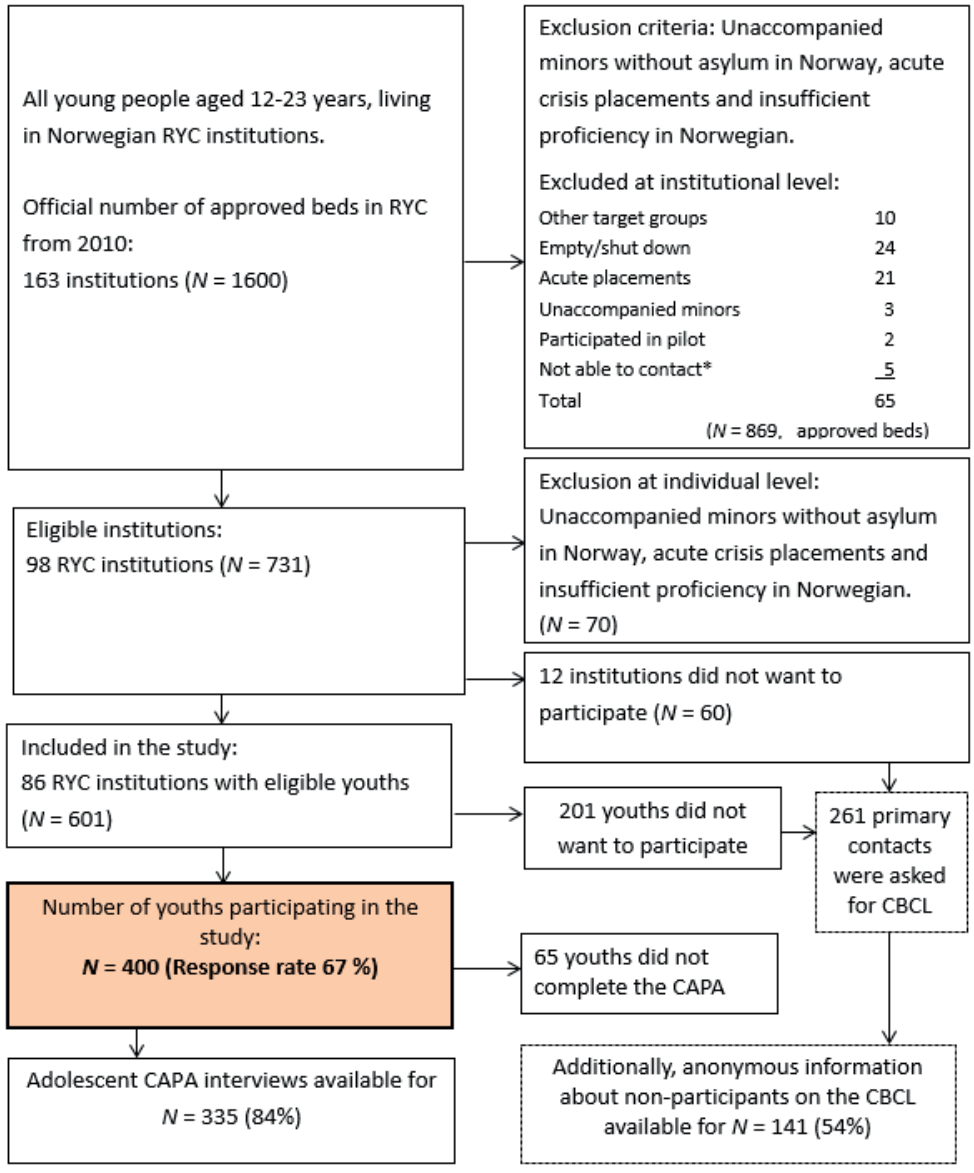


Figure 7. Flow chart of inclusion (Modified after Jozefiak et al., 2016)

3.3 Measures

An overview of the measures used in this thesis is given in Table 1.

Table 1. Overview of instruments

Instrument	Topic	Informants	Paper
Interview:			
Child and Adolescent Psychiatric Assessment (CAPA)	Psychopathology, childhood maltreatment, substance use	Adolescents	Papers 1–3
Interview about the adolescent	ADHD, attachment difficulties, autism spectrum disorder	Primary contacts	Papers 1 and 3
Additional interview	History of care, household dysfunction, school, substance use	Adolescents	Papers 1–3
Questionnaire:			
KINDL-R	Quality of life	Adolescent/primary contacts	Papers 2 and 3
Child Behavior Checklist (CBCL)	Psychopathology	Primary contacts	Paper 2
Self-Perception Profile for Adolescents (SPPA)	Self-esteem	Adolescents	Paper 3

3.3.1 Psychopathology

The Child and Adolescent Psychiatric Assessment (CAPA) is a semi-structured psychiatric interview designed to gather information from children and adolescents (127). The protocol contains both required questions and optional follow-up questions. The CAPA uses a

computer-based algorithm for diagnostic evaluation and is used to produce the DSM-IV diagnosis. Adolescents are considered not to be fully reliable reporters of symptoms of attention deficit/hyperactivity disorder (ADHD), autism spectrum disorder (ASD) and RAD compared with adults who know them well (128-130). Information about these diagnostic spectra was therefore collected from their primary contact at the institution using the ADHD CAPA parent version interview section, selected questions from the preschool age version (PAPA) of the CAPA and the Asperger syndrome diagnostic interview (ASDI) (61). All RAD questions of the PAPA were used except three that were considered inadequate for describing maladaptive adolescent behavior such as "negative reunion response," "do not seek comfort" and "frozen watchfulness," and were therefore excluded. Considering the possibility of a medication effect, a previously given ADHD diagnosis was accepted even if the interview revealed subthreshold symptoms. Inter-rater reliability was examined using a procedure in which 10% of audiotaped interviews (n = 42) were recorded by a randomly selected different interviewer. Inter-rater reliabilities between rater pairs as estimated by Gwet's AC_1 (and agreement rate) were: ASD = 0.83 (88%), ADHD = 0.74 (83%), CD = 0.78 (86%), oppositional defiant disorder (ODD) = 0.97 (98%), RAD = 0.82 (88%), substance abuse = 0.69 (76%), MDD = 0.89 (93%), dysthymia = 0.92 (95%), agoraphobia without panic = 1.0 (100%), specific phobia = 0.86 (88%), social phobia = 0.87 (91 %), obsessive–compulsive disorder (OCD) = 1.0 (100%), and generalized anxiety disorder (GAD) = 0.93 (95%). The Child Behaviour Checklist (CBCL) scores were available for the participants, as well as for 141 anonymous nonparticipants. These data made it possible to estimate the complete diagnoses according to the DSM-IV for 541 adolescents using Bayesian multiple imputation estimation. *Estimated* prevalence rates of psychiatric diagnoses showed only a small deviance from the *observed* prevalence rates, which were based on completed psychiatric interviews, thereby confirming the representativeness of the 335 youths who completed the psychiatric interview. For more information, see Jozefiak et al., 2016 (2).

3.3.2 Childhood adversity

Information about childhood adversity was drawn mainly from selected questions of the CAPA:

(1) *Witness of violence,* where the person saw or heard, but was not the subject of, an event with potential for life-threatening or severe physical injury, including seeing someone

shot or killed, hearing someone raped or beaten in an adjacent room, or seeing someone killed or severely injured in an accident.

(2) *Victim of physical violence,* where the person was the victim of physical violence, with one or more people (not a family member) using force against him/her with potential to cause death or serious injury. Force may have been used to get something (e.g., mugging or robbery) or to intimidate or frighten the subject, or for its own sake (assault, fight, or torture). The victim may have been threatened with a weapon.

(3) *Victim of family violence,* where the person was the victim of physical abuse by a member of the family.

(4) *Victim of sexual abuse,* where a sexual abuse episode or episodes occurred in which a person ("the perpetrator") involved the child or adolescent in activities for the purpose of the perpetrator's own sexual gratification. Activities included kissing (that made the person uncomfortable), genital fondling (over or under clothing), oral–genital or oral–anal contact, genital or anal intercourse, or use of instruments. Sexual abuse does not include medical exams or mutually desired sexual relations with a peer.

In addition to this, a measure of *household dysfunction* was included. This variable was constructed from the answers provided by adolescents to questionnaire items regarding the reason for their first removal from the family home and whether their parents had a history of any psychiatric problems, often got drunk, or used drugs. Those who answered positively to at least one of these questions or who had been removed from the family home because of parental crime, alcohol or drug abuse, or psychiatric problems, received a positive score on household dysfunction (see Appendix 1).

A modified scale was constructed and the number of types of adversities, including household dysfunction, was added. Confirmatory factor analysis was conducted and, after excluding the variable "victim of community violence," the scale showed a one-factor structure with a good model fit to the data [root mean square error of approximation (RMSEA) = 0.00 (90% confidence interval (CI) 0.00 to 0.08), comparative fit index (CFI) = 1.00, Tucker–Lewis index (TLI) = 1.00]. Thus, a scale (range 0–4) describing the load of childhood adversities was developed and comprised the variables of witnessing violence, victim of family violence, victim of sexual abuse, and household dysfunction.

3.3.3 Quality of life

The KINDL-R is a well-established QoL instrument for children aged 8–16 years that has been used in several clinical and epidemiological studies. A parent proxy version is available. The questionnaire comprises 24 items and six subscales: Physical well-being, Emotional well-being, Self-esteem, Family, Friends, and School. Each item addresses the child's experience over the past week and is rated on a 5-point scale (1 = never, 5 = always) (see Appendix 2). The mean item scores are calculated for all subscales and transformed to a 0–100 scale, 100 indicating very high QoL. Psychometric testing of the KINDL-R has revealed good scale utilization and scale fit as well as moderate internal consistency (131). A Norwegian normative study also confirmed satisfactory internal consistency (Cronbach's α = 0.69 to 0.81 for the subscales for 10th graders (aged 14-16 years)) and satisfactory test–retest reliability (79). There was a large structural missing percentage on the school subscale because 29% of the adolescents in the present study did not attend school. The items of the family subscale that asked about experiences of family living over the past week did not fit the target group of the present study, and was therefore not applied. Thus, in Paper 2, five subscales of the KINDL-R were used to measure aspects of QoL: Physical well-being, Emotional well-being, Self-esteem, Friends, and School. In Paper 3, three subscales of the KINDL-R were used to measure well-being: Physical well-being, Emotional well-being, and Friends.

3.3.4 Mediators

Global self-esteem was measured by the revised version of the Self-Perception Profile for Adolescents (SPPA), which was administered to the adolescent participants in the study. The original questionnaire contains 45 items, which results in eight specific subdomains of self-esteem and one five-item measure of global self-worth (132). In this thesis, the term "global self-esteem" is used to represent the SPPA scale "global self-worth". The revised version of the questionnaire is available in Norwegian and was culturally adapted with a simplified response format, in which each statement was followed by four response options (1 = "describes me poorly" to 4 = "describes me very well") (see Appendix 3). The revised scale showed better convergent and factorial validity than the original scale in a study of Norwegian adolescents from the general population (133). The SPPA is based on the theory of self-esteem as a multidimensional concept. The eight specific subdomains each represent a different arena in which the individual adolescent will have a specific evaluation of his/her own competence. By contrast, global self-esteem constitutes a general perception of the self

and of how much the individual likes himself/herself as a person. Thus, the SPPA constitutes two different categories of self-evaluation. In Paper 3, a focus on global self-esteem using five items was chosen. In a longitudinal study of the development of global and domain-specific self-esteem among Norwegian adolescents and young adults, von Soest et al. reported a satisfactory internal consistency of the Global Self-Worth subscale with α values from 0.78 to 0.81 across different time points (134).

Attachment difficulties. The adolescents themselves were not considered to be reliable reporters of attachment difficulties, and this information was therefore collected from their primary contact at the institution. RAD is not incorporated as a part of the CAPA. Thus, this information was collected using selected items from the PAPA. A latent variable was constructed using 11 of 15 available symptom items on which the RAD diagnosis is based. Three items were considered not to be well suited for an adolescent population and therefore were omitted. These were "seeking comfort from strangers," "negative reunion response," and "frozen watchfulness." One item ("lack of interest in people") was omitted because of a high percentage of missing values (75.5%). Originally, the items were scored from 0 to 1, 2, or 3. To construct a comparable scale, all item scores were regrouped to fit a two-point scale, ranging from 0 (no problem) to 2 (problems in most activities or with most people), with a high score indicating more attachment difficulties.

Substance use. As part of the CAPA interview, the adolescents were asked 18 specific questions about whether they had ever tried certain stimulants and substances, including alcohol and tobacco as well as illicit drugs such as heroin, cocaine, and cannabis. This resulted in a variable with a score ranging from 0 to 18 (see Appendix 4).

3.4 Ethics

The Norwegian Regional Committee for Medical and Health Research Ethics approved the present study (Reference no. 2013/1128/REC Central) and the main research project "*Mental health in children and adolescents in child welfare institutions"*. Written informed consent was obtained and, if the participant was younger than 16 years, consent from the guardian was also obtained. To avoid participants feeling pressured to participate, the head of the institution received detailed oral and written information about the research project. A standardized information/invitation letter was distributed to the adolescents that had been approved by the

Committee for Medical and Health Research Ethics. This information letter highlighted that participation in the project was voluntary, that the adolescent did not need to complete all questions, and that the participant could retract already given consent at any time. When the research assistant arrived at the institution, the same information was given once again orally to ensure that the adolescent gave informed, voluntary consent to participate in the study.

3.5 Statistical methods

Statistical analyses were conducted using SPSS version 21 and 22, and Mplus versions 6 and 7.31 (135). A significance level of 0.05 was chosen, and 95% CIs are reported where relevant. Pearson correlation coefficients of 0–0.29 were considered small, 0.3–0.59 moderate and 0.6–1.0 high.

In Paper 1, percentages were compared using Pearson's chi-squared test, and means were compared using Student's *t* test. Logistic regression was used to analyze the odds of diagnosis in different maltreatment categories, after adjusting for sex, age, and other maltreatment categories. To measure the impact of poly-victimization on psychopathology, a "victimization scale" was constructed. Confirmatory factor analysis was conducted, and the model fit of the victimization scale was evaluated using the CFI, the TLI, and RMSEA. With respect to the CFI and TLI, values >0.95 were considered indications of good fit; with respect to the RMSEA, values <0.06 were considered indications of good fit (136).

In Paper 2, KINDL-R subscale scores for the three groups of adolescents (RYC youth with maltreatment, RYC youth without maltreatment and adolescents from the general population) were compared using a general linear model (ANCOVA). To compare the KINDL-R subscale scores with the self-reported number of types of adversities, linear regression analyses were conducted with the latter as an independent variable. Linear regression was also used to study the effects of categories of childhood adversities on the KINDL-R subdomains. Both ANCOVA and linear regression were adjusted for age and sex. CIs for Pearson's correlation coefficients were based on the Fisher z-transformation. An attrition analysis was conducted to determine whether there were any significant differences between participants who had completed the KINDL-R self-report and those who had not. This was done by using Student's *t* test to compare the mean scores on the internalizing and externalizing problem subscale scores of the CBCL.

In Paper 3, structural equation modeling (SEM) was used to test two path models to examine whether the associations between (i) Childhood maltreatment and Psychopathology; and (ii) Childhood maltreatment and Well-being were mediated by Global self-esteem, Attachment difficulties, or Substance use. To assess the goodness-of-fit of the two models, the chi-squared test, CFI, TLI, and RMSEA were used. A nonsignificant chi-squared test result, CFI- and TLI-values >0.95, and RMSEA-values <0.06 were considered to be indicators of good model fit (136). In the first step of the structural analyses, Psychopathology and Well-being were regressed on Childhood maltreatment in two separate analyses to calculate the direct effects. In the next step of the analyses, the three potential mediators were included simultaneously in each model and regressed on Childhood maltreatment. Psychopathology and Well-being were also regressed on the potential mediators. The path models were adjusted for sex and age in the analyses. Bootstrapping with 1000 draws was used to obtain reliable standard errors for calculating the indirect effects.

Descriptions of how missing data were handled are given in each paper.

4. RESULTS

4.1 Paper 1

Previous maltreatment and present mental health in a high-risk adolescent population

A high prevalence (71%) of exposure to maltreatment (witnessing violence, physical violence from a family or non-family member or sexual abuse) was found in the adolescents in RYC. Reported exposure to maltreatment was associated with female sex, older age, and more placements out of the family home.

Adolescents with reported exposure to maltreatment had a significantly higher prevalence of several psychiatric disorders than their non-maltreated peers in RYC. These were: ASD, 26.0%; CD, 20.7%; MDD, 29.1%; dysthymia, 13.5%; GAD, 7.8%; present suicidal thoughts, 14.0%; and having attempted suicide, 41.5%.

Adolescents in the maltreatment group fulfilled the criteria for a higher mean number of diagnoses (2.8) than their non-maltreated peers (1.5). Therefore, an analysis to investigate the prevalence of comorbid diagnosis pairs was conducted. Adolescents exposed to maltreatment had significantly increased odds of several diagnosis pairs, most importantly, an increased prevalence of the combination of internalizing and externalizing disorders, such as CD and MDD (odds ratio (OR), 23.2) and CD and GAD (OR, 4.92).

A higher number of types of adversities (witnessing violence, victim of family violence, victim of sexual abuse, and household dysfunction) was associated with increased odds of ASD (OR, 1.42), CD (OR, 1.58), MDD (OR, 1.76), GAD (OR, 2.23), and of having attempted suicide (OR, 1.37) (Figure 8).

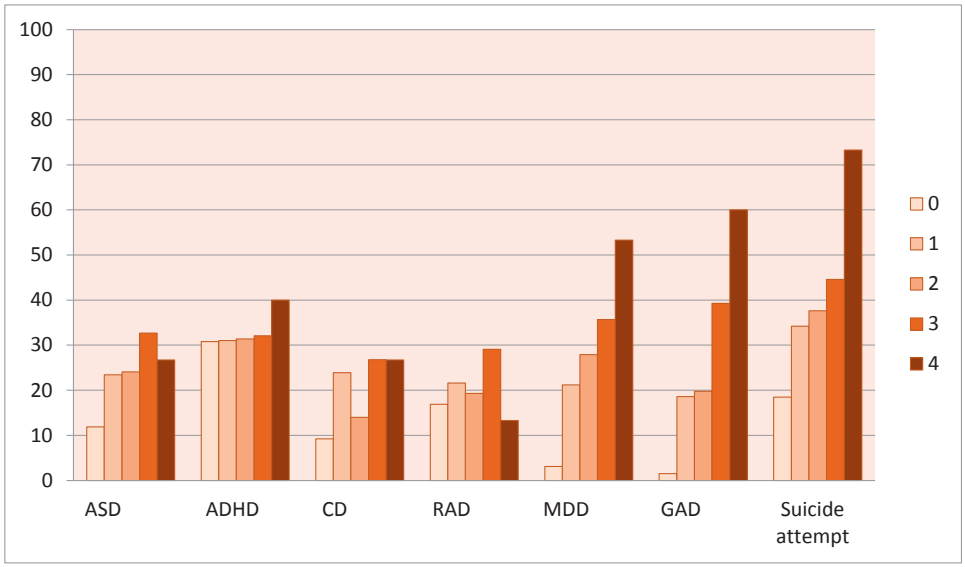


Figure 8. Percentage of adolescents in RYC who fulfilled the diagnostic criteria related to the number of types of adversities.

Clarification

In Paper 1, the title of Table 4 is somewhat misleading. The title in the published manuscript was *Prevalence of psychiatric disorders and suicidal ideation related to different forms of maltreatment. OR compared to unexposed, adjusted for sex, age, and other forms of maltreatment.*

However, the ORs were not compared between the maltreated and unexposed (non-maltreated) individuals, but between the maltreated and those who were unexposed to the individual type of maltreatment. A more precise title is *Prevalence of psychiatric disorders and suicidal ideation related to different forms of maltreatment. ORs adjusted for sex, age, and other forms of maltreatment.*

4.2 Paper 2

Child maltreatment and quality of life: a study of adolescents in residential care

Adolescents in RYC with a history of maltreatment were compared with their unexposed peers in RYC and to adolescents from the general population. Adolescents with a history of maltreatment reported poorer QoL than did their peers in the control groups. Compared with their unexposed peers in RYC, the maltreated adolescents reported significantly poorer QoL scores on the subdomains Physical Well-being, Emotional Well-being, and Friends. Compared with the general population sample, the maltreated adolescents reported significantly poorer QoL scores on the subdomains Physical Well-being, Emotional Well-being, Self-esteem, and Friends.

A higher number of types of adversities (witnessing violence, victim of family violence, victim of sexual abuse, and household dysfunction) was associated with poorer QoL scores for all five subdomains (Physical Well-being, Emotional Well-being, Self-esteem, Friends, and School) (Figure 9).

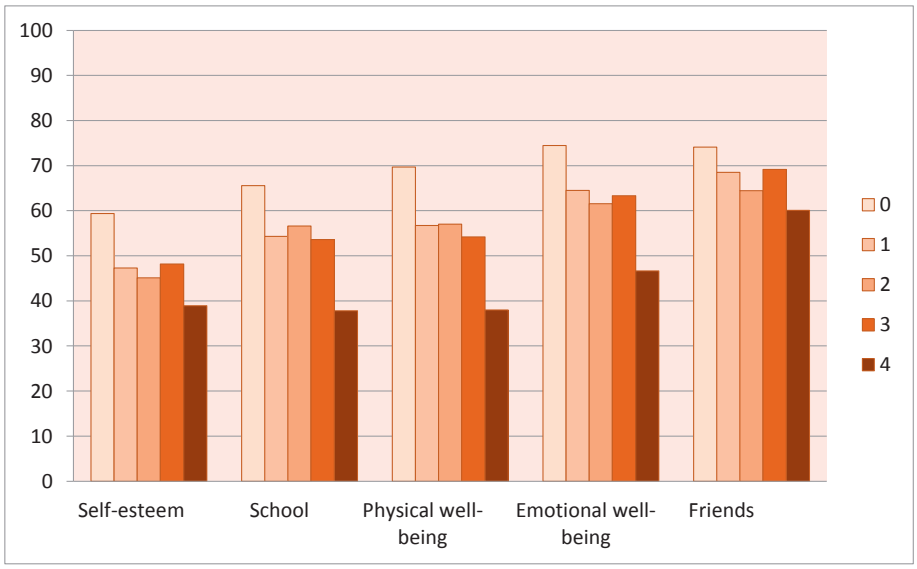


Figure 9. Self-reported quality of life according to number of types of adversities.

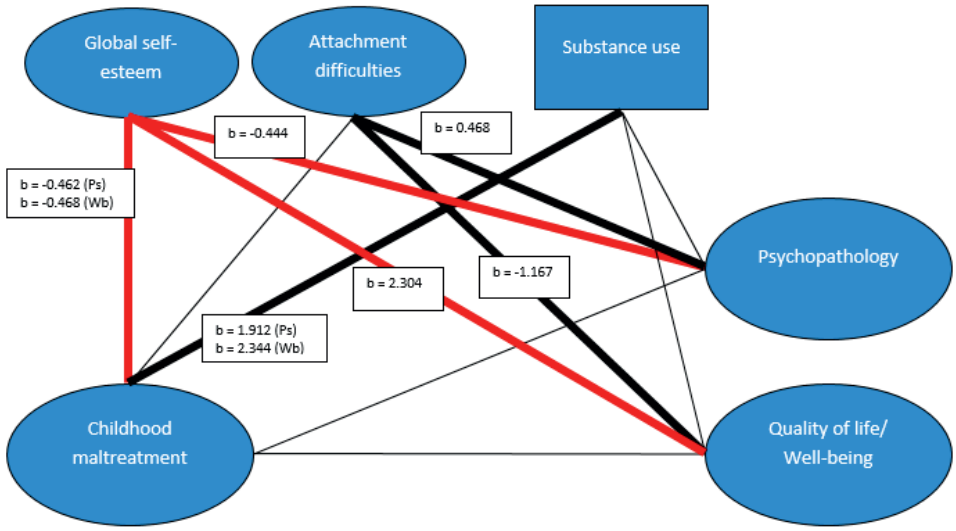
For the participants in RYC, the proxy reports were scored by the primary contacts at the institutions. For the general population sample, the reports were scored by parents. The primary contacts in RYC did not report any differences in QoL scores between adolescents with and without childhood maltreatment history. However, the primary contacts reported significantly lower QoL score on all five subscales than did the parents in the general population sample. In the proxy reports, there were no differences in QoL scores for subdomains according to the number of types of adversities.

4.3 Paper 3

Childhood maltreatment, psychopathology and well-being: The mediator role of global self-esteem, attachment difficulties and substance use

In the Psychopathology model, the direct effect between Childhood maltreatment and Psychopathology changed from significant to nonsignificant when the three mediators Global self-esteem, Attachment difficulties, and Substance use were added to the model, which indicated a full mediating effect. Childhood maltreatment was associated with Global self-esteem and Substance use in the Psychopathology model. However, Psychopathology was associated with Attachment difficulties and Global self-esteem but not with Substance use. Thus, Global self-esteem was the only possible mediator in the model (Figure 10). A high level of Childhood maltreatment was significantly associated with a low level of Global self-esteem ($b = –0.462$, $p < 0.01$), and a low level of Global self-esteem was significantly associated with a high level of Psychopathology ($b = –0.444$, $p < 0.01$). The indirect effect of this path was borderline significant ($b = 0.205$, $p < 0.1$, 95% CI of the regression coefficient, –0.007 to 0.390).

In the Well-being model, the direct effect between Childhood maltreatment and Well-being changed from significant to nonsignificant when the three mediators Global self-esteem, Attachment difficulties, and Substance use were added to the model, which indicated a full mediating effect of the mediators. Childhood maltreatment was associated with Global self-esteem and Substance use in the Well-being model. However, Well-being was associated with Attachment difficulties and Global self-esteem but not with Substance use. Thus, Global self-esteem was the only possible mediator in the model (Figure 10). A high level of Childhood maltreatment was associated with a low level of Global self-esteem ($b = –0.468$, $p < 0.01$), and a low level of Global self-esteem was associated with a low level of Well-being ($b = 2.304$, $p < 0.01$). The indirect effect was also significant with a negative loading ($b = –1.078$, $p < 0.01$); this indicated that, when mediated by Global self-esteem, a high level of Childhood maltreatment was associated with a low level of Well-being.



Note. b is the unstandardized regression coefficient; only significant values are shown. Ps indicates the results of the Psychopathology model. Wb indicates the results of the Well-being model.

Figure 10. Results of the Psychopathology model and Well-being model with mediation. Significant associations are shown with bold lines. Red lines show the significant mediator paths.

The results of this study showed that Global self-esteem was a mediator of paths in both models, whereas Attachment difficulties and Substance use were not.

5. DISCUSSION

5.1 Main findings

Children and adolescents in RYC are generally at high risk of psychiatric disorders and of poor QoL (2, 21). This thesis examined a subgroup within this high-risk population. A high percentage of adolescents in RYC reported that they had experienced witnessing violence or had been victims of physical violence or sexual abuse. This subgroup of adolescents had an increased risk of a broad variety of psychiatric disorders such as MDD, GAD, CD, and ASD compared with their non-maltreated peers in RYC. In addition, they had a higher rate of present suicidal thoughts and of having attempted suicide. The total load of psychiatric morbidity was higher in the subgroup of maltreated adolescents. Comorbidity was investigated by studying the prevalence of diagnosis pairs in the two groups of adolescents, and the results showed that the prevalence of several diagnosis pairs was increased among the maltreated adolescents. The cooccurrence of internalizing and externalizing disorders such as CD and MDD highlights the complexity of the load of psychiatric morbidity in this population.

The second paper of this thesis focused on QoL. Maltreated adolescents had poorer QoL scores for several of the subdomains investigated compared with both their peers in RYC and the general population youth.

Papers 1 and 2 aimed to investigate the impact of poly-victimization. An adversity scale with four variables was created, and the results showed that an increasing load of adversity was associated with increased risk of ASD, MDD, GAD, CD, suicide attempts, and poor QoL scores on all five subdomains (Physical well-being, Emotional well-being, Friends, School, and Self-esteem).

Papers 1 and 2 confirmed that in this high-risk population, there were strong and robust associations between childhood maltreatment and psychopathology, and between childhood maltreatment and poor QoL. In Paper 3, Global self-esteem (a general perception of the self and of how much the individual likes himself/herself as a person) was identified as a mediator of both associations. This is important because it suggests that Global self-esteem may be a potential target for interventions in this high-risk population. Thus, this thesis shows that childhood maltreatment seems to play a key role in the development of psychiatric morbidity and in the negative pathway to poor QoL in these adolescents and offers a positive view by

identifying potential targets for intervention that might help in the prevention of this negative pathway.

5.2 Psychopathology

A very high total prevalence of psychiatric disorders was found in the study population of interest (adolescents in RYC with a history of maltreatment). Could this reflect an increasing prevalence of psychiatric disorders in the general population? In the public media, one could gain the impression that more and more people are diagnosed with psychiatric disorders. However, according to the Norwegian Institute of Public Health, even though there is an increase in sick leave related to mental health problems, the prevalence of psychiatric disorders in adults is relatively stable. Among adolescents in the general population, there may be a slight increase in the prevalence of depression and a slight decrease in the prevalence of behavioral disorders (137). This trend is confirmed by data from the Norwegian prescription database that show an increase in the prescription of antidepressants to adolescents aged 15–19 years over the period 2004–2013 (137). In their study of Norwegian 7–9-year-olds in the general population, Nøvik and Jozefiak reported that parental reports showed stable or even slightly decreasing prevalence of emotional and behavioral problems measured by the CBCL across a 16-year interval (138). In the general population of children and adolescents in Norway, it is estimated that 8% fulfill the criteria for a psychiatric disorder, and 15–20% have reduced daily life function because of mental health problems (55, 57). The prevalence rates found in this thesis are significantly higher than these estimates. Therefore, it is unlikely that the results of this thesis simply reflect trends in the general population.

Based on the literature review of childhood maltreatment and psychiatric disorders (34-36, 39), it was expected that differences in the prevalence of some psychiatric disorders, such as a higher prevalence of depression, anxiety, and CD among maltreated adolescents would be found in these youths. However, some of the results were unexpected. The literature also reports higher prevalence rates of PTSD and ADHD among maltreated adolescents (34, 139, 140), which was not found here. A higher prevalence of ASD based on the adolescents' maltreatment history was not expected.

The main results from this thesis indicate that childhood maltreatment plays a key role in the development of psychiatric disorders in youths in RYC. However, the only trauma-specific disorder included in this thesis was PTSD, which had a very low prevalence (0.6%). Therefore, in this study population, it seems that trauma-related symptomatology is better described by other psychiatric diagnoses than PTSD. The diagnostic criteria of PTSD do not cover the developmental perspective, and this may partly explain why PTSD seemed to capture only a small fraction of the symptoms expressed in this population. In a prospective study of a New Zealand birth cohort of 972 individuals, Koenen et al. reported that all young adults with past-year PTSD at age 26 years had received another mental disorder diagnosis by age 21 years (141). These findings suggest that individuals with a history of mental health problems who are exposed to traumatic events might be at higher risk of developing PTSD than are trauma-exposed individuals without a history of mental health problems.

In van der Kolk's proposal of DTD, diagnostic criteria and symptom clusters include symptoms of emotional and physiological dysregulation/dissociation, problems with conduct and attention regulation, and difficulties with self-esteem regulation and in managing social connections (69). One of the main arguments against including DTD in the DSM-V is the conflict with the tradition of constraining on the description of symptoms and excluding causal interpretations of the diagnostic categories. Arguments for inclusion include the possibility for explaining comorbidity, to enhance research and to enable effective treatment models (69). This topic illustrates a main problem of the diagnostic principles in the DSM, in which the descriptions of symptoms are the basis of the diagnoses (except for PTSD and RAD) and explanatory models are excluded (51).

It is well documented that maltreated children present a broad variety of symptoms. As a result, in the current nosological diagnostic system, *several* psychiatric diagnoses are necessary to describe the present symptomatology of the individual, but they are not necessarily accurate (142). An increasing number of research reports support a causal relationship between childhood maltreatment and psychiatric disorders such as depression (99, 143, 144). However, not all cases of depression are caused by childhood maltreatment. Within the current diagnostic systems, a phenomenological approach to diagnoses does not necessarily lead to an understanding of the relationship between symptoms and life events without profound knowledge of the individual's history. Thus, there is a risk that the

symptoms of a traumatized individual might be viewed as incidental to his/her life history, which could delay the initiation of effective treatment and interventions.

Another result that was expected, but was not found, was a difference in the prevalence of ADHD between maltreated and non-maltreated youths in RYC. The prevalence was 31.6% in both groups, which is very high compared with the estimated prevalence in the general adolescent population in Norway (2–5%); the similarity between groups was surprising. Difficulties with regulation of activity and attention are well-known symptoms of ADHD but are also common problems after trauma, and may have caused misdiagnosis. One interpretation of this finding is that the diagnostic processes related to ADHD in the project were accurate and that there were few false-positive diagnoses. However, more research is needed to draw specific conclusions related to ADHD among adolescents in RYC.

In the DSM-IV, the criteria for ASD are based on impairments in social interaction and communication, and a repetitive or stereotypic behavioral pattern with an onset before age 3 years (145). Because the adolescents themselves were not considered reliable reporters of symptoms related to ASD, this information came mainly from the primary contact at the institution, who most likely had not known the individual before age 3 years. However, these contacts still reported symptoms and problems in social interaction and communication, and a behavioral pattern similar to that in individuals with ASD. The reason for this difference in prevalence between adolescents with and without a maltreatment history remains unclear, but there are four main factors that might influence the results. First, it is possible that children with ASD born in vulnerable families with a lack of resources are more exposed to maltreatment. A higher level of parental stress (146) and poorer maternal mental health (147) have been found among parents of children with ASD, both of which could be associated with increased interpersonal violence in the family. However, in a large epidemiological study with 50 000 participants aged 0–21 years, Sullivan et al. did not find an increased prevalence rate of maltreatment among individuals with autism (148). Second, it is also possible that the impairments in social interaction and communication of adolescents with ASD make it easier for them to report a history of maltreatment than do peers without ASD, thereby resulting in an increased reported maltreatment rate. Third, it is possible that exposure to childhood maltreatment during vulnerable developmental periods may induce difficulties in behavior and social interaction that are so close to ASD in expression that it is difficult to differentiate

them in adolescence. Finally, it is possible that maltreatment can provoke biological modifications in individuals with a genetic predisposition to ASD.

Even though the prevalence of some diagnoses was low, the mean number of diagnoses in each individual was high compared with their non-maltreated peers in RYC. This is an indicator of the complexity of problems and struggles of adolescents in RYC with a maltreatment history. Comorbid disorders are common, and the various nature of the disorders adds to the complexity. Depression and anxiety are well known as comorbid disorders (149, 150) but, in this study population, an increased risk of comorbidity between substantially different disorders such as MDD and CD or GAD and CD was also identified. These results are consistent with the results of Putnam et al. who reported that an increasing number of childhood adversities was associated with increased complexity of adult psychopathology, as indexed by the number of lifetime DSM-IV diagnoses and coexistence of internalizing and externalizing disorders (48). This is especially important among adolescents in RYC, because when both categories of disorders are present at the same time, it is more likely that caregivers in CWS will focus mainly on the externalizing problems of the CD that might cause problems for the surroundings, and that their internalizing problems do not receive the necessary attention, care, and interventions.

In this context, it is necessary to discuss the usefulness of diagnoses in this population with regards to choice of interventions. In child and adolescent psychiatry, diagnoses are important working tools that, ideally, ensure that co-workers have a mutual understanding of problems and a mutual approach to treatment and interventions. Diagnoses are used in both research and clinical practice to help describe problems and to ensure that the best-practice treatment is provided for individual patients. However, the thesis results highlight the complexity of childhood adversities among adolescents in RYC, and the accompanying complexity of psychiatric problems. A strong focus on phenomenological diagnostics may draw attention away from the underlying mechanisms and counteract a mutual understanding, and thus prevent effective treatment. A panel of youths with experience of CWS in Norway has criticized the use of diagnoses to describe their symptoms and problems. The panel members stated that diagnoses pathologize the individual traumatized youth instead of his/her adverse background and environment, and can become a source of chronic stigmatization. Even though psychologists and psychiatrists find diagnoses a useful and necessary tool, our current nosological diagnostic system has limitations.

A good relationship between the patient and therapist is essential to every therapeutic relationship. To enhance the healing process, a mutual understanding between patient and therapist is necessary. When childhood adversity, comorbid disorders and symptom expression complicate the relationship, an additional focus on QoL might be an alternative and helpful approach in the patient–therapist relationship. An individual's QoL is influenced by, but not limited to, his/her mental health status. In contrast to psychopathology, QoL has a positive value, and it is possible to have a good QoL even with a high symptom level; it has also been shown that QoL can be improved even with a stable high symptom load of psychiatric disorders (151). Further, the finding that Global self-esteem acts as a mediator between both Childhood maltreatment and Psychopathology, and Childhood maltreatment and Well-being supports the use of this approach in interventions to improve Global self-esteem to provide a positive contribution to counteract the risk of both Psychopathology and poor Well-being among these vulnerable adolescents.

5.3 Quality of life

QoL can be defined in different ways. The WHO defines QoL as "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns"(74). In children, this includes the child's own experiences across several life domains, such as physical and emotional well-being, self-esteem and the child's relationships with family, friends, and school (75). In Paper 2 in this thesis, QoL was studied by examining physical, emotional and social well-being (friends), self-esteem, and relationship with school. In Paper 3, *well-being* was studied by examining physical, emotional, and social well-being as measured by three KINDL-R subscales. Present physical and mental health can influence QoL and well-being, although the concept of QoL is not restricted to diagnoses or symptoms. The high burden of psychopathology in this study population led us to expect a poor score on the emotional well-being domain, but the poor score that was found on the other QoL subdomains was not necessarily expected.

In a large study of children and adolescents in the USA, Simon et al. report that health-related QoL is determined by biological factors (greater disease burden, severe asthma, being overweight), medical system factors (unmet medical needs, insurance status) and sociodemographic factors (poverty, smoker in the household, single-mother family, older age

groups) (19). Jozefiak and Kayed reported that adolescents in RYC evaluated their physical well-being as poorer than did adolescents in child and adolescent psychiatry (CAP) outpatient clinics (21). In light of previous research showing strong associations between childhood maltreatment and adult physical health problems (26); it is worrying that the adolescents with a history of maltreatment in this study population reported poorer physical well-being compared with their non-maltreated peers in RYC. It is possible that this is an early indicator of later physical health problems. Further, Simons et al. suggested that unmet medical needs are a determinant of low QoL (19). This indicates that ensuring adolescents in RYC receive the physical health assessment they need is critical. Thus, assessment of QoL can complement the physical and mental health examination and broaden the understanding of the struggles of individual youths.

5.4 Childhood adversity and poly-victimization

The results of this thesis indicate that childhood maltreatment plays a key role in the development of psychopathology and poor QoL among adolescents in RYC. This underscores the importance of trauma assessment when an adolescent enters RYC. Previous research has aimed to identify the different aspects of childhood maltreatment that may influence the prevalence of negative outcomes later in life. Several factors have been suggested as important, such as age, developmental stage, and the type, frequency, and severity of maltreatment. One aspect—poly-victimization—has gained broad support in research and has been shown to be significant in several different populations. Poly-victimization occurs when the individual is exposed to several different types of victimization and has been repeatedly confirmed as an important factor (34, 43, 46, 49, 83, 152). Different types and numbers of types of victimization have been studied, and the main results are robust and reproduced. The results of this thesis confirm that the total load of adversity and victimization the child has been exposed to is directly related to the total load of problems in adult life.

Exposure to an increasing number of different types of adversity increases the risk of several psychiatric disorders and poor QoL. Therefore, the trauma assessment should be broad and repeated to encompass relevant adversities in an individual's history. To my knowledge, there are no mutual or general policies or routines to determine how this is conducted in Norwegian RYC. In the aftermath of the first results of the project "*Mental health in children and adolescents in child welfare institutions*", the Norwegian Directorate for Children, Youth and

Family Affairs, and the Norwegian Directorate of Health developed a report describing recommendations for health services to children in CWS care (153). This report was based on several reports from interdisciplinary workgroups including employees of CWS, CAP, and community health services. The report describes recommendations for future interventions to enhance the cooperation between CWS and CAP, and to facilitate access to mental health services for children and adolescents in RYC. In short, some of the main topics of these recommendations are: (i) enhance cooperation between services to secure assessment of health service needs; (ii) to establish dedicated health personnel in community health services and CAP outpatient units to service children in CWS care; (iii) to enhance cooperation between CWS and CAP when children and adolescents are in need of institutional placements; (iv) to facilitate access to and improve services from the municipality; and (v) to improve agreements for cooperation between services (153). The report does not address the topic of childhood maltreatment, which is a major limitation. However, I believe that all adolescents in this population, for whom maltreatment history is the rule more than the exception, could profit from the described interventions in general and that a trauma-informed approach in all areas could contribute to improvements in the health and care services for this group of high-risk adolescents.

5.5 Pathways from childhood adversity to negative outcomes

This thesis is based on cross-sectional data, and therefore, causal conclusions cannot be made. It is possible that children with psychiatric disorders and poor well-being are at higher risk of exposure to maltreatment and adversity than are healthy children. However, the literature supporting an association between childhood maltreatment and later psychopathology is vast (26, 33-42), and some literature supports an association between childhood maltreatment and later poor QoL (81, 82, 84, 85). Kendall-Tackett described four pathways through which childhood maltreatment might influence later health: behavioral, social, cognitive and emotional pathways (89). The three factors investigated in this thesis—Global self-esteem, Attachment difficulties, and Substance use—represent examples of the cognitive (global self-esteem and attachment difficulties), emotional (attachment difficulties) and behavioral (substance use) pathways.

Global self-esteem, a general perception of self and of how much the individual likes himself/herself as a person, was identified as a mediator of the association between childhood

maltreatment and psychopathology, and of the association between childhood maltreatment and well-being. Childhood maltreatment was associated with poorer global self-esteem. Further, global self-esteem was positively associated with well-being and negatively associated with Psychopathology. Even though it is not possible to conclude the direction of these associations, these results suggest that improving global self-esteem in this high-risk population might either decrease the risk of psychopathology and poor well-being, or if the associations are directed the opposite way, decrease the risk of maltreatment. Either way, the results suggest that improving global self-esteem may have a positive effect on the individual adolescent's life. However, intervention studies focusing on improving global self-esteem are needed to expand knowledge on this topic.

The latent variable Attachment difficulties was constructed using 11 of 15 available symptom items on which the RAD diagnosis is based. This variable was associated with psychopathology and well-being, but not with childhood maltreatment and thus, the attachment difficulties variable was not found to act as a mediator of either of the two models investigated in this thesis. In their study of Japanese adolescents in RYC, Suzuki et al. reported that child maltreatment affected depression through attachment styles and low self-esteem (118). Therefore, using a different approach to measure attachment in these adolescents, such as attachment styles, might have given different results.

Substance use as operationalized in this thesis was not found to act as a mediator. The study participants were asked if they had ever used any item on a list of substances including alcohol and different types of tobacco, and the total number of substances used was then used as an observed variable. Only the question about if they ever used the substances was asked, and the participants were not asked about the frequency or amount used, or the age at debut. This variable was chosen on the assumption that having tried many different types of substances would be associated with increased risk behavior and thereby may be associated with more psychopathology and poorer well-being. However, this effect was not observed in the analyses. Substance use was significantly associated with a history of childhood maltreatment but not with psychopathology or well-being. A variable including the frequency of use and age at debut would have provided more information; it is possible that the total amount of time spent using substances is more important in terms of psychopathology and well-being than the number of substance types used. It is also possible that the mixture of legal (tobacco and alcohol) and illegal substances in the variable obscured the results.

5.6 Strength and limitations

The main strength of this thesis is that it was based on representative data obtained through nationwide inclusion of participants and a comprehensive mental health assessment, including both semi-structured diagnostic interviews and questionnaires (2). The sample size and the high prevalence of risk factors made it possible to investigate associations that are difficult to find in other smaller samples. Primary contacts, who were leaders of the institutions and teachers, were used as informants in addition to the adolescents themselves. Of those invited to participate in the study as an individual, 400 of 601 gave their consent. However, the Norwegian Regional Committee for Medical and Health Research Ethics gave permission to collect anonymous CBCL data via primary contacts also from nonparticipants. This information was used in an attrition analysis in which the DSM-IV diagnoses were estimated based on CBCL data for 541 adolescents (400 participants and 141 nonparticipants). Nonparticipants had significantly higher scores on five of the eight CBCL subscales. However, the Pearson's effect sizes were small (0.10–0.30), thereby confirming the representativeness of the data from the RYC population. For more detailed information, see Jozefiak, 2016 (2).

Another attrition analysis was conducted as part of this thesis in Paper 2 to compare the CBCL scores for internalizing and externalizing problems between participants with and without a completed KINDL-R. There were no significant differences between externalizing problem scores, although those who had completed the KINDL-R had a slightly lower internalizing problem score than those who did not complete the KINDL-R (mean difference, 2.35; 95% CI, (0.16–4.55). Thus, the results regarding QoL outcome in this thesis might be slightly underestimated compared with the total sample of adolescents in RYC who participated in the study (N = 400) because the adolescents' actual QoL score would be slightly lower than that reported in this thesis.

In 1965, Sir Bradford Hill proposed nine criteria to establish causation in medical research (154). Van Reekum et al. reviewed these criteria applied to neuropsychiatric research and argued that they should be handled as guidelines rather than criteria, and that four of the nine are necessary to establish causal relationships and the other five provide further support of causality (155). In this thesis, three of four of these necessary criteria were fulfilled: (i) there was a strong association between childhood adversity and psychopathology, and between

childhood adversity and QoL; (ii) the results are consistent with results from other populations and settings; and (iii) there is a biological rationale in the neurobiological framework referred to earlier in the thesis. In addition, there is a biological gradient that further supports a causal relationship. More adversities were associated with a poorer outcome. However, this thesis is based on cross-sectional data, and the required criterion of a temporal sequence is therefore not fulfilled. A randomized controlled trial would be unacceptable because of ethical concerns regarding exposure to maltreatment, but a longitudinal design with repeated measurements may have expanded our data collection.

The diagnostic interview (CAPA) was used as a source of information about childhood maltreatment in addition to the study-specific questionnaires. Although it is a validated instrument for psychiatric diagnosis and it provided a broad spectrum of information, it is not an optimal instrument for the assessment of childhood maltreatment. Information about neglect and emotional abuse is lacking. However, because of the non-random selection of adolescents into RYC, it is reasonable to assume that all have experienced some form of neglect. Further, the frequency of maltreatment, timing in relation to the developmental period, and severity were not reported. All of these factors are considered to be important according to international research (67, 156, 157) and would be expected to contribute to the increased risk of psychopathology. Thus, the results of this thesis may have underestimated the risk of psychopathology. The definition of sexual abuse in the CAPA interview is broad and includes both kissing (that made you uncomfortable) and rape. However, very few participants (3.3%) reported exposure to sexual abuse without any other exposure to maltreatment or adversity. Thus, the broad definition is most likely of minor importance in the analyses.

Only a limited number of adversities were measured in the present study. Measuring these along with other types, such as exposure to robbery, theft, or bullying, may have provided further useful information. The addition of other instruments to assess maltreatment and victimization, such as the MACE (27) or the JVQ (28) may have increased the specific information about maltreatment and victimization in this thesis; however, they were not available in Norwegian at the time of the data collection. The information about the abuse experienced was collected only from the adolescents themselves, and it possible that this contributed to some degree of recall bias. Retrospective studies of adults reporting childhood maltreatment have been found to contain some false-negative reports, but few false-positive

reports (158). In their study of 1413 young adults in New Zealand, Scott et al. found that prospective and retrospective assessment of childhood maltreatment predicted adult psychopathology to a similar degree (159). Because of the shorter time interval since the maltreatment in this project, it is reasonable to believe that there would be even less bias in the reports by adolescents compared with those by adults, although the possibility of some false-negative reports arising from a reluctance to speak in the interview setting cannot be ruled out completely.

We did not have the opportunity to include parents as informants, thereby limiting our understanding of early development and family function in these studies. Therefore, the requirement in some diagnoses, such as RAD for developmental continuity and early onset could not be used, and the KINDL-R subscale Family had to be excluded. Diagnosing RAD in adolescents is controversial; however, even though one of the diagnostic criteria of RAD is the presence of symptoms before the age of 5 years, subscales of RAD were shown to be highly associated with functional impairment in a group of English high-risk adolescents (117).

To assess psychopathology in Paper 3 of this thesis, the CAPA dimensional symptom scores on which the three prevalent DSM-IV diagnoses were based were used: GAD, MDD, and CD. Therefore, the resulting latent variable Psychopathology does not comprise combinations of the three diagnoses, but rather the dimensional symptom scores. However, this method has been used in another study of personality disorders, which showed acceptable to good reliability (160).

The KINDL-R instrument was originally designed for individuals aged 6–16 years, but in this study, it was used for adolescents aged up to 20 years. However, it was also used in two earlier Norwegian studies of youths aged up to 17 years (161) and up to 20 years (162).

One question that arises is whether different conclusions could have been made if youth on acute placement, adolescents without Norwegian language skills and minors seeking asylum had been included. Adolescents in RYC on acute placement are most often in a state of crisis. It is reasonable to assume that their ability to report on lifetime events and even symptoms over the past 3 months would be affected. A state of crisis would likely be accompanied by strong emotions and affects, which could dominate the cognitive ability of the individual in an unpredictable way. It has been documented that minors seeking asylum have experienced a

high rate of childhood adversities and have a high risk of psychiatric disorders (163, 164). Adolescents without Norwegian language skills would also be mainly of non-Western origin with a history of different adversities such as refugee status, war exposure, cultural differences, and broken relationships. Therefore, including these adolescents would most likely have led to an even higher rate of maltreatment history and psychopathology. However, the results would have been more difficult to interpret.

Four trained research assistants were interviewers in this project. They were educated in relevant fields, but they were not psychologists or psychiatrists. The CAPA is a semi-structured interview, which helped to compensate for their lack of clinical experience. The research assistants were trained to use the comprehensive glossary of the CAPA. The diagnostic conclusions were based on computer algorithms using information from the diagnostic interview and questionnaires. The inter-rater reliability was calculated and was considered good. The agreement rate ranged from 76% (substance abuse) to 100% (agoraphobia without panic and OCD) (2).

The analyses were adjusted for age and sex, but not for SES, which represents a clear limitation. However, SES data about the adolescents' families was unavailable. Even if SES information about the adolescent's biological family had been available, this would not have been useful because the reasons for the placements were often mental illness or severe drug problems in parents, which would affect their SES. On the other hand, in an earlier study, QoL self-reports in Norwegian students from the general population were not significantly influenced by SES as measured by parental education (165).

The organization of the Norwegian CWS is described in more detail earlier in this thesis. The RYC units are generally small, mostly with room for 3–5 residents, and it is questionable whether the results are directly transferable to other RYC populations in countries where the CWS organizations differ from the Norwegian model. However, adolescents in RYCs in all countries will most often represent a selected high-risk group that has experienced more adversities than their peers, and some resemblances have been reported across countries. For example, Ford et al. reported a prevalence of psychiatric disorders among British children in residential care of 71% (8). This is similar to the total prevalence of psychiatric disorders of 76% of the study population in this thesis (2).

6. CONCLUSIONS

This thesis investigated associations between experiences of childhood adversity, current psychopathology, and QoL among adolescents in Norwegian RYC. Adolescents in RYC had experienced a high rate of childhood maltreatment. Associations were found between Childhood maltreatment and current psychiatric diagnoses, and between Childhood maltreatment and poor QoL scores. A high number of types of childhood adversities was repeatedly confirmed as a factor associated with negative outcomes regarding Psychopathology and QoL.

Three potential mediators were studied, although only one, Global self-esteem, was confirmed as a mediator in the statistical analyses. However, Global self-esteem was identified as a mediator of both the association between Childhood maltreatment and Psychopathology, and between Childhood maltreatment and Well-being.

This thesis expands the current knowledge about a selected high-risk group within a high-risk population of adolescents in RYC. Both risk factors and mediators were identified, and these may provide targets for the development of interventions. This gives hope for future preventive strategies.

7. CLINICAL IMPLICATIONS AND FUTURE RESEARCH PERSPECTIVES

Adolescents in RYC are frequent users of health care services (166). However, the results of this thesis lead one to wonder whether they receive the health care they need. The results highlight the importance of a broad assessment of childhood history whenever a child or adolescent enters CWS out-of-home care. The total load of childhood adversity is a major risk factor that should always be considered by the clinician whenever the risk of psychiatric disorders is assessed. Further, the results confirmed that, among adolescents with a history of maltreatment, comorbidity is common, and therefore the clinician's assessment should be thorough and with a broad focus.

This thesis did not focus on the treatment of mental health problems. However, the overall results revealing a very high prevalence of psychiatric disorders and poor QoL among adolescents with a history of childhood maltreatment indicate that trauma-informed care should be implemented at all levels of care and health service in this population.

This thesis was based on cross-sectional data, and longitudinal studies are needed to draw conclusions about causality. Future longitudinal studies of treatments and interventions in this high-risk group are needed to develop effective prevention strategies, and more studies are needed to explore the mechanisms and pathways to go beyond descriptions of the symptoms and diagnoses. The results of this thesis indicate that QoL should be included as an outcome measure in future research and that enhancing global self-esteem may be useful for effective prevention strategies.

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Paper I

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Research article

Previous maltreatment and present mental health in a high-risk adolescent population☆

Hanne Klæboe Greger[a,d,*], Arne Kristian Myhre[b,c], Stian Lydersen[d], Thomas Jozefiak[a,d]

[a] Department of Child and Adolescent Psychiatry, St. Olavs Hospital, Pb 6810 Elgeseter, 7433 Trondheim, Norway
[b] Regional Center on Violence, Traumatic Stress and Suicide Prevention, Region Mid-Norway, Schwachs Gate 1, 7030 Trondheim, Norway
[c] Children's Clinic, St. Olavs Hospital, Pb 3250 Sluppen, 7006 Trondheim, Norway
[d] Norwegian University of Science and Technology (NTNU), Faculty of Medicine, RKBU Central Norway, Pb 8905, MTFS, N-7491 Trondheim, Norway

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ABSTRACT

Childhood maltreatment is known to increase the risk of future psychiatric disorders. In the present study, we explored the impact of experienced maltreatment on the prevalence and comorbidity of psychiatric disorders in a high-risk population of adolescents in residential care units. We also studied the impact of poly-victimization. The participants of the study were adolescents in residential care units in Norway ($n = 335$, mean age 16.8 years, girls 58.5%). A diagnostic interview (Child and Adolescent Psychiatric Assessment Interview) was used, yielding information about previous maltreatment (witnessing violence, victim of family violence, community violence, sexual abuse) and DSM-IV diagnoses present in the last three months. Exposure to maltreatment was reported by 71%, and in this group, we found significantly more Asperger's syndrome (AS) ($p = .041$), conduct disorder (CD) ($p = .049$), major depressive disorder (MDD) ($p = .001$), dysthymia ($p = .030$), general anxiety disorder (GAD) ($p < .001$), and having attempted suicide ($p = .006$). We found significantly more comorbid disorders in the maltreated group. Poly-victimization was studied by constructing a scale comprised of witnessing violence, victim of family violence, victim of sexual abuse and household dysfunction. We found that poly-victimization was associated with significantly increased risk of MDD, GAD, AS, CD, and having attempted suicide ($p < .01$). The complexity of the clinical outcomes revealed in this study suggest that longer-term treatment plans and follow-up by psychiatric services might be needed to a greater extend than for the rest of the child and adolescent population, and that trauma informed care is essential for adolescents in residential youth care.

A substantial amount of international research in recent decades has established that childhood adversities are important risk factors for the development of mental health problems. Several studies have shown that childhood physical abuse, sexual abuse, and witnessing family or community violence are factors that may lead to impaired mental health in adolescence (Gover, 2004; Helweg-Larsen, Frederiksen, & Larsen, 2011; Kaplan et al., 1998; McLaughlin et al., 2012; Mills et al., 2013), as well as later in life (Afifi et al., 2014; Cater, Andershed, & Andershed, 2014; Chapman et al., 2004; Felitti et al., 1998; Franzese,

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* Corresponding author. Present address: 7675 Palmilla Dr #6421, San Diego, CA 92122, USA.

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Covey, Tucker, McCoy, & Menard, 2014; Norman et al., 2012). Studies of childhood abuse in the Norwegian general population have reported a prevalence of physical abuse of 5–6% (both sexes) and of sexual abuse of 10–14% (girls) and 3–4% (boys) (Sorbo, Grimstad, Bjorngaard, Schei, & Lukasse, 2013; Thoresen, Myhre, Wentzel-Larsen, Aakvaag, & Hjemdal, 2015). These rates are similar to the prevalence of child sexual abuse in European countries, which was estimated by Stoltenborgh et al. in their meta-analysis (14% of girls and 6% of boys) (Stoltenborgh, van Ijzendoorn, Euser, & Bakermans-Kranenburg, 2011) but are lower than those found in the Adverse Childhood Experiences (ACE) study in the United States, where the prevalence of childhood physical abuse was reported to be 27% (girls) and 30% (boys), and the prevalence of child sexual abuse was reported to be 25% (girls) and 16% (boys) (Prevalence of Individual Adverse Childhood Experiences, 2014). The childhood prevalence of witnessing intimate partner violence in high-income countries has been estimated to be 8–25% (Gilbert et al., 2009). A study of a Norwegian clinical population of 12- to 18-year-olds in a child and adolescent psychiatric outpatient setting reported a prevalence of 34% for physical abuse, 29% for sexual abuse and 28% for neglect (Reigstad, Jorgensen, & Wichstrom, 2006). In the present study, the term "maltreatment" will include sexual abuse, physical abuse and witnessing physical violence.

Anxiety, depression, post-traumatic stress disorder (PTSD), eating disorders, sleep disorders, suicide attempts, substance abuse and behavioral disorders are among the psychiatric problems associated with childhood maltreatment in previous studies (Afifi et al., 2014; Chen et al., 2010; Fry, McCoy, & Swales, 2012; Kaplan et al., 1998; Norman et al., 2012; Widom, DuMont, & Czaja, 2007). There has also been a growing amount of literature showing that poly-victimization (exposure to more than one type of adversity) increases the risk of several psychiatric disorders and symptoms, such as anxiety, depression, PTSD and ideation of suicide and self-harm (Afifi et al., 2014; Cater et al., 2014; Chan, 2013; Finkelhor, Ormrod, & Turner, 2007; Ford, Grasso, Hawke, & Chapman, 2013). In the ACE study, four categories of household dysfunction were included (household substance abuse, criminal behavior, mental illness and mother/stepmother being battered) in addition to child abuse, and these sources of dysfunction were reported to contribute to an increased risk of mental and physical health problems (Felitti et al., 1998). In the present study, we chose to investigate witnessing violence as a separate type of childhood maltreatment, but we also wanted to include measures of household dysfunction to study the impact of poly-victimization in this population. The term "household dysfunction" will hereafter represent parental psychopathology, criminality and alcohol or substance abuse.

Children and adolescents in out-of-home care are at an increased risk of emotional, behavioral, and psychosocial problems compared with general child and youth populations (Ford, Vostanis, Meltzer, & Goodman, 2007; McMillen et al., 2005). The published prevalence of psychiatric disorders in different countries has varied substantially in the last decades due to the use of different diagnostic criteria, methods and assessment tools (Roberts, Attkisson, & Rosenblatt, 1998). Therefore, direct comparisons of the results can be challenging. In their study of 17-year-olds in the Missouri foster care system, McMillen et al. found that 47% of 169 youths living in congregate care met the criteria for at least one psychiatric disorder during the year prior to the study. Ford et al. reported that 71% of children and adolescents (5- to 17-year-olds) in residential settings met the criteria of a psychiatric disorder (Ford et al., 2007). The prevalence of psychiatric diagnoses in the general adolescent population in Norway has not been fully studied, but one study reported a prevalence of major depressive disorder (MDD) of 2.6% and dysthymia of 1.0% among junior high school students in Norway (Sund, Larsson, & Wichstrom, 2011). This prevalence is lower than the reported prevalence of depression of 6.7% among adolescents (12- to 17-year-olds) in the United States (Perou et al., 2013) but comparable with the prevalence of depression among 13- to 15-year-olds in Great Britain (2.5%) (Ford, Goodman, & Meltzer, 2003). Other studies have reported a total prevalence of any DSM-IV diagnosis in the general child population of Norway of 6.1% (8- to 10-year-olds) (Heiervang et al., 2007) and 50.9% among Norwegian children in foster care (6- to 12-year-olds) (Lehmann, Havik, Havik, & Heiervang, 2013). In the last study, they also found that age at first placement, the number of placements, violence exposure, and serious neglect were risk factors for psychiatric disorders (Lehmann et al., 2013). Several studies have shown that the prevalence of psychiatric disorders increases with age during childhood and adolescence (Ford et al., 2003); therefore, we would expect to find a higher prevalence of disorders among youth aged 12–20 years both in the general population and among youth in the child welfare system.

Some of the major reasons for placement in out-of-home care are unsatisfactory conditions in the home and child maltreatment (StatisticsNorway, 2011). In Norway, foster home placement would normally be the first choice when out-of-home care is needed. Adolescents in residential youth care are likely to have experienced a higher number of out-of-home placements and to have a higher prevalence of mental disorders than children in other areas of child welfare services (Ford et al., 2007). Therefore, they can be considered a population at high risk of mental disorders. Because Norwegian residential care units are custodial facilities, children and adolescents in need of therapy or treatment for psychiatric problems must be referred to child and adolescent psychiatry facilities to receive either in-patient or out-patient services.

Structured psychiatric interviews are considered to be the most reliable method to estimate the prevalence of psychiatric diagnoses in a study population, yet the majority of previous studies are based on self-report questionnaires (Edwards, Holden, Felitti, & Anda, 2003; Felitti et al., 1998; Helweg-Larsen et al., 2011; Peltonen, Ellonen, Larsen, & Helweg-Larsen, 2010) and conducted on general adult (Afifi et al., 2014; Cater et al., 2014; Felitti et al., 1998; Green et al., 2010) or adolescent (McLaughlin et al., 2012) populations.

Previous research focusing on the impact of childhood adversities in a high-risk adolescent population has been studied in different settings. Leenarts et al. found a direct relationship between exposure to early-onset interpersonal trauma and mental health problems in girls in Dutch residential care facilities (Leenarts et al., 2013). Boxer and Terranova found that even among adolescents in a psychiatric hospital ward, maltreatment experiences accounted for variations in levels of

psychopathology (Boxer & Terranova, 2008), while Gover found a higher prevalence of depression among sexually abused incarcerated youth in the US than among those who had not been sexually abused (Gover, 2004). One study also found an association between exposure to trauma and risk behavior among adolescents entering a residential treatment facility (Harr, Horn-Johnson, Williams, Jones, & Riley, 2013). Adolescents in residential care are young people with special health care needs about to enter adulthood. From a clinical point of view, knowledge about the impact of their past experiences on their present mental health status would be important for providing the best possible health care and facilitating optimal development into adulthood. To the best of our knowledge, no studies have investigated the association between childhood maltreatment and a broad spectrum of psychiatric diagnoses, including assessment of impairment, duration and onset, in adolescents in residential care units.

The main objective of this study was to explore the impact of self-reported maltreatment on the prevalence and comorbidity of psychiatric disorders in a high-risk adolescent population. We also studied the cumulative effect of the number of types of maltreatment, including household dysfunction, in a population where *all* participants have a baseline of broken relations and experiences of adverse family functioning. In a recent study of youths living in residential youth care, Jozefiak et al. found considerable comorbidity between anxiety, depressive disorders and serious behavioral disorders, reflecting the complexity of the difficulties these adolescents face (Jozefiak et al., 2015). Therefore, in the present study we also wanted to explore if childhood maltreatment is associated with increasing comorbidity between behavioral and emotional disorders.

Method

Participants and Recruitment

The data used in this study were obtained from the Norwegian research project *Mental Health in Adolescent Residents in the Child Welfare System* (Jozefiak et al., 2015). All child welfare institutions hosting adolescents aged 12–23 years in Norway were invited to participate in the study. A total of 70 adolescents were excluded. The exclusion criteria were being an unaccompanied minor without asylum in Norway ($n = 7$), being an adolescent on acute placement ($n = 24$), having insufficient Norwegian language qualifications to be interviewed ($n = 13$) and other reasons ($n = 26$). Unaccompanied minors without asylum in Norway and adolescents on acute placement were considered to be in such a high state of crisis that data collection should not be prioritized (Øyri, 2014). The principal contact at the institution decided what was considered a sufficient level of Norwegian language qualifications. A total of 86 of the 94 institutions accepted the study invitation, and 400 of the 601 eligible adolescents participated, giving a response rate of 67%. Of those included in the study, 335 youths completed the psychiatric interview, yielding diagnostic information according to the DSM-IV. Child Behavior Check List (CBCL) scores were available for the participants, as well as for 141 anonymous non-participants. These data made it possible to estimate complete DSM-IV diagnoses for 541 adolescents using Bayesian multiple imputation estimation (Jozefiak et al., 2015). Estimated prevalence rates of psychiatric diagnoses showed only small deviance from the observed prevalence rates, thereby confirming the representativeness of the 335 youths who completed the psychiatric interview (for further details, see Jozefiak et al., 2015).

Procedures

Data collection was conducted by research assistants who visited the institutions and completed structured psychiatric interviews with adolescents and their principal contacts and collected questionnaires from adolescents, principal contacts, and leaders of the institutions. A principal contact is defined as the member of the institutional staff who has individual responsibility for a single youth on a regular daily basis. Trained interviewers ($N = 4$) had at least an education in relevant fields (master's degrees in psychology/social work, bachelor's in mental health and a nurse specialized in mental health) and extensive prior experience in working with children and families. Throughout the period of data collection, a team of child and adolescent psychiatrists and psychologists were on call in case of emergencies. Data were collected from June 2011 until July 2014.

Instruments

Psychiatric diagnostic interview: Child and Adolescent Psychiatric Assessment (CAPA). The CAPA is a semi-structured psychiatric interview designed to gather information from children and adolescents. It contains required and optional questions, including onset dates, duration, frequency and intensity of symptoms, to ensure that the interviewer gets the information required for diagnostic conclusions according to the DSM-IV (Angold et al., 1995). The CAPA uses a computer-based algorithm for diagnostic evaluation, which results in DSM-IV diagnoses. Adolescents are considered not to be fully reliable reporters of symptoms of attention deficit/hyperactivity disorder (ADHD), Asperger syndrome (AS) and reactive attachment disorder (RAD), compared with adults who know them well (Mazefsky, Kao, & Oswald, 2011; Owens, Goldfine, Evangelista, Hoza, & Kaiser, 2007; Swanson, Owens, & Hinshaw, 2012). Information concerning these diagnostic spectra was, therefore, collected from their principal contact at the institution using the ADHD CAPA interview section, selected questions from the preschool age version (PAPA) of the CAPA, and the Asperger syndrome diagnostic interview (ASDI) (Gillberg, Gillberg, Rastam, & Wentz, 2001). All RAD questions of the PAPA were used except three because they were considered inadequate for describing

maladaptive adolescent behavior: 'negative reunion response,' 'do not seek comfort' and 'frozen watchfulness;' these questions were therefore excluded. A previously given ADHD diagnosis was accepted even if the interview revealed subthreshold symptoms, taking into account the possibility of a medication effect. Regular meetings with master coders were held. Ten percent of the audiotaped interviews ($n = 42$) were recoded by blinded interviewers. Interrater reliability scores for the rater pairs, as estimated by Gwet's AC_1 (and total agreement), were AS $AC_1 = 0.83$ (88%); ADHD $AC_1 = 0.74$ (83%); CD $AC_1 = 0.78$ (86%); oppositional defiant disorder (ODD) $AC_1 = 0.97$ (98%); RAD $AC_1 = 0.82$ (88%); substance abuse $AC_1 = 0.69$ (76%); MDD $AC_1 = 0.89$ (93%); dysthymia $AC_1 = 0.92$ (95%); agoraphobia without panic $AC_1 = 1.0$ (100%); specific phobia $AC_1 = 0.86$ (88%); social phobia $AC_1 = 0.87$ (91%); obsessive compulsive disorder (OCD) $AC_1 = 1.0$ (100%), and GAD $AC_1 = 0.93$ (95%) (for further details, see Jozefiak et al., 2015).

Classifying Groups of Exposure by the CAPA. In this study, we wanted to focus on those adolescents living in residential care units who also had experienced different types of maltreatment. To extract the group of interest, we used the following specific items from the CAPA:

(1) *Witness of violence* – Person saw or heard but was not the object of an event with the potential for life threat or severe physical injury, including seeing someone shot or killed, hearing someone raped or beaten in an adjacent room, or seeing another person killed or severely injured in an accident.
(2) *Victim of physical violence* – Subject has been the victim of physical violence, with one or more people (not a family member) using force against them with potential to cause death or serious injury. Force may have been used to get something (e.g., mugging or robbery), to intimidate or frighten the subject, or for its own sake (e.g., assault, fight, or torture). The victim may have been threatened with a weapon.
(3) *Victim of familial physical violence* – Subject has been the victim of physical abuse by a member of the family.
(4) *Victim of sexual abuse* – Sexual abuse episode(s) in which a person ('the perpetrator') involved the child or adolescent in activities for the purpose of the perpetrator's own sexual gratification. The activities may have included kissing (that made the person uncomfortable), genital fondling (over or under clothing), oral–genital or oral–anal contact, genital or anal intercourse, or the use of instruments. Sexual abuse does not include medical exams or mutually desired sexual relations with a peer.

All participants who indicated that they had experienced at least one of these items were included in the exposed group ($n = 237$). The participants that did not respond positively to these questions were used as a reference group ($n = 98$).

Further, we wanted to explore the variable *Witness of violence* in more detail. We had information regarding both the victim and perpetrator of the violence; thus, we extracted a subgroup that had witnessed family violence in which both the victim and perpetrator were family members. Participants that had witnessed violence other than family violence were classified as witnessing community violence. These categories were not exclusive; one participant could witness both family and community violence. They will be referred to in this paper as 'exposure to family violence' and 'exposure to community violence,' respectively, to distinguish them from 'victim of family violence' and 'victim of community violence,' in which cases the adolescent is the target of violence. Witnessing included both visual and auditory exposure.

Victimization Scale – Measuring the Impact of Poly-victimization. We also wanted to investigate the impact of poly-victimization on the development of mental health problems. We constructed a modified scale based on the ACE questionnaire (Felitti et al., 1998), with the number of maltreatment types registered, including household dysfunction, added. This last variable was composed of the answers provided by adolescents to questionnaire items regarding the reason for their first removal from the family home and whether their parents had a history of any psychiatric problems, often got drunk or used drugs. Those who answered positively to at least one of these questions, or had been removed from the family home because of parental crime, alcohol or drug abuse, or psychiatric problems, received a positive score on household dysfunction. The two variables measuring witness experiences were merged in this scale. Because of high correlation, it was not possible to keep them as separate items in the constructed scale. A confirmatory factor analysis was conducted, and after excluding the variable 'victim of community violence', our scale showed a one-factor structure with good model fit to the data [root mean square error of approximation (RMSEA) = 0.00 (90% confidence interval (CI) 0.00–.08), comparative fit index (CFI) = 1.00, Tucker–Lewis index (TLI) = 1.00]. Thus, a scale (range 0–4) describing the load of adverse childhood experiences was developed that consisted of the variables of witnessing violence, victim of family violence, victim of sexual abuse, and household dysfunction.

Statistics

Proportions were compared using Pearson's chi-squared test, and means were compared using the Student *t*-test. We used logistic regression to analyze the risk of diagnosis in different abuse categories, adjusting for sex, age and other abuse categories. These analyses were conducted using the Statistical Package for the Social Sciences (SPSS), version 21. Where odds ratios (ORs) could not be calculated because of a zero cell count, we used penalized maximum likelihood estimation (MLE) with Firth's method in the software LogXact 10. Wilsons's score confidence intervals for proportions were calculated as recommended previously (Altman, Machin, Bryant, & Gardner, 2000). A confirmatory factor analysis was conducted in Mplus, version 6 (Muthén & Muthén, 1998–2012). The model fit of the abuse scale was evaluated using the CFI, the TLI, and

Table 1
Characteristics of adolescents with and without reported exposure to maltreatment.

	Maltreatment	No maltreatment	*p*
Number (%)	237 (70.7)	98 (29.3)	
Age			
Mean age, years (SD)	**17.0 (1.31)**	**16.5 (1.30)**	**.005**
Age range, years	12–20	12–19	
Sex			
Girls	**64.6% (*n* = 153)**	**43.9% (*n* = 43)**	**.001**
Voluntary/involuntary placement			
Voluntary	44.2%	44.8%	.916
Involuntary	55.8%	55.2%	
Mean number of placements out of family home	**3.6**	**2.9**	**.020**
Mean age at first placement, years	12.8	12.0	.082
Education/employment			
Attending school	65.0% (*n* = 152)	73.2% (*n* = 71)	.146
Employed	3.4% (*n* = 8)	6.1% (*n* = 8)	.253
Unemployed	2.5% (*n* = 6)	5.1% (*n* = 5)	.230
Others	29.1% (*n* = 71)	15.6% (*n* = 14)	

Note. Others = for instance vocational training, not wanting or able to attend school or work. Adolescents are placed in RYC units for different juridical reasons (i.e. voluntary vs. involuntary) according to the Norwegian Act of Child Protection.

the RMSEA. With respect to CFI and TFI, values above 0.95 were considered indications of a good fit, whereas values below 0.06 were considered indications of a good fit with respect to the RMSEA (Yu, 2002). Inter-rater reliability was evaluated by calculating Gwet's AC_1. This indicator was chosen because the prevalence rates varied from 0.6% to 37.2%, and Cohen's kappa is not a suitable measure of inter-rater reliability when the prevalence is low (Gwet, 2008). Gwet's AC_1 was calculated in AgreeStat (supplied commercially by Gwet at http://www.agreestat.com/agreestat.html). A significance level of 0.05 was chosen, and 95% confidence intervals (CI) are reported where relevant.

Ethics

The Norwegian Regional Committee for Medical and Health Research Ethics approved the present and the main study (number of reference: 2013/1128/REK midt). They also approved anonymous CBCL scores for non-participants for an attrition analysis. Written informed consent was obtained, and if the participant was under 16 years of age, consent from the guardian was also obtained. To ensure the avoidance of participants feeling pressure to participate, the head of the institution received detailed oral and written information about the research project. A 6-page standardized information/invitation letter was distributed to the adolescents, which had been approved by the Committee for Medical and Health Research Ethics beforehand. This information letter described, in detail and using an easy language, what kind of information was to be assessed. It was also underlined that participation in the project was voluntary, that the adolescent did not need to complete all questions and that at any time, the participant could retract already given consent. When the research assistant arrived at the institutions the same information was given once again orally to ensure that the adolescent gave informed, voluntary consent to participate in the study.

Results

Prevalence

Table 1 shows the characteristics of the two groups of participants: those who reported exposure to maltreatment and those who did not. There were no significant differences regarding school attendance or age at first out-of-home placement or voluntary placement. A comparison of Norwegian youths with first- and second-generation immigrants did not reveal any significant differences. Overall, there was a high prevalence of self-reported maltreatment (71%). Only 6% had been exposed to family violence, while 27% had been exposed to community violence. There was a high prevalence of victims of family violence (39%), victims of community violence (24%), and sexual abuse or rape (27%), and a high degree of poly-victimization, with 35% of the adolescents being exposed to more than one type of maltreatment. There were significantly more girls in the group reporting exposure to maltreatment than in the reference group (64.6% and 43.9%, respectively), and youths in this group were also significantly older (mean age 17.0 and 16.5 years, respectively) and had experienced significantly more placements out of the family home.

Table 2 shows some descriptive information concerning sex differences, as we adjusted our main analysis for sex. Girls had a higher mean number of diagnoses and a higher mean number of experienced types of victimization. Among the girls, 40.8% had experienced sexual abuse, and 46.4% reported having been a victim of family violence. This was substantially more than among the boys, where 6.5% had experienced sexual abuse, and 27.3% were victims of family violence.

Table 3 shows the prevalence of psychiatric disorders in the last three months, adjusted for sex and age. Adolescents who reported exposure to one or more types of maltreatment had significantly higher odds for Asperger's syndrome (AS),

Table 2
Different types of maltreatment, psychiatric disorders, and suicide attempts in boys and girls (OR adjusted for age).

	Girls (n = 197) %	Boys (n = 138) %
Reported any form of maltreatment	78.1	60.4
Exposure to family violence	8.7	2.9
Exposure to community violence	25.5	28.8
Victim of family violence	46.4	27.3
Victim of community violence	19.9	30.2
Victim of sexual abuse or rape	40.8	6.5
Exposure to household dysfunction	64.2	48.8
Mean no. of types of victimization (victimization scale 0–4)	1.8	1.1
Any emotional disorder	60.7	37.4
Any behavioral disorder	14.8	29.5
Any diagnosis	70.6	68.5
Attempted suicide	44.3	23.2
Mean no. of diagnoses	2.4	1.7

Note. Any emotional disorder = at least one of the following diagnoses: GAD, panic anxiety, agoraphobia, specific phobia, social phobia, MDD, dysthymia, depression not otherwise specified, eating disorder, bipolar disorder, OCD, PTSD. Any behavioral disorder = at least one the following diagnoses: CD, ODD.

conduct disorder (CD), MDD, dysthymia, and generalized anxiety disorder (GAD). They also had significantly higher odds for having any anxiety disorder (including GAD, social phobia, specified phobia, panic anxiety, and agoraphobia), and had a significantly higher total number of diagnoses in this study, including significantly increased odds of having at least one diagnosis. Additionally, they had significantly higher odds of having current suicidal thoughts and of having ever attempted suicide. The prevalences of some of the diagnoses we assessed were low and are therefore not shown in the tables. For instance, the prevalence of PTSD was only 0.6%. However, all participants that fulfilled the diagnostic criteria of substance dependence, substance abuse (except alcohol and tobacco), bulimia, panic anxiety with agoraphobia, and PTSD, and all participants with current suicidal plans, belonged to the group of adolescents reporting exposure to maltreatment.

Table 4 shows the prevalence of psychiatric disorders in the last three months for adolescents who reported a history of maltreatment, adjusted for age, sex, and for the other types of maltreatment focused on in this study. These results show that exposure to family violence was associated with significantly increased odds for ADHD, GAD, and for having any anxiety disorder. Exposure to community violence was associated with significantly increased odds for CD. Victims of family violence had significantly increased odds of AS, dysthymia, GAD and any anxiety. Victims of community violence had significantly increased odds for CD, MDD, GAD, any anxiety and for having at least one diagnosis. Victims of sexual abuse

Table 3
Prevalence of psychiatric disorders and suicidal ideation in the last three months (OR adjusted for sex and age).

	Maltreatment (n = 237) % (95% CI)	No maltreatment (n = 98) % (95% CI)	OR (p)
AS	**26.0 (20.7, 32.0)**	**16.3 (10.1, 25.2)**	**2.0 (.041)**
ADHD	31.6 (26.1, 37.8)	31.6 (23.3, 41.4)	1.0 (.872)
CD	**20.7 (16.0, 26.3)**	**15.3 (9.5, 23.7)**	**2.0 (.049)**
RAD	21.6 (16.8, 27.4)	19.6 (12.7, 28.8)	1.1 (.684)
Substance abuse (except tob/alc)	4.2 (2.3, 7.6)	0 (0, 3.8)	7.5 (.150)[a]
Substance dependence	5.1 (2.9, 8.6)	0 (0, 3.8)	8.5 (.128)[a]
MDD	**29.1 (23.7, 35.2)**	**9.2 (4.9, 16.5)**	**3.6 (.001)**
Dysthymia	**13.5 (9.7, 18.4)**	**3.1 (1.0, 8.6)**	**3.9 (.030)**
GAD	**27.8 (22.5, 33.9)**	**4.1 (1.6, 10.0)**	**8.9 (<.001)**
Any anxiety	**41.8 (35.7, 48.1)**	**18.4 (11.9, 27.2)**	**3.0 (<.001)**
Any diagnosis	**80.2 (74.6, 84.7)**	**64.3 (54.4, 73.1)**	**2.3 (.002)**
Suicidal thoughts[b]	**14.0 (10.1, 19.0)**	**5.2 (2.2, 11.6)**	**2.8 (.041)**
Suicidal plans[b]	5.2 (3.0, 8.8)	0 (0, 3.8)	8.8 (.121)[a]
Suicide attempt	**41.5 (35.4, 47.9)**	**20.8 (13.9, 30.0)**	**2.2 (.006)**
Mean number of DSM-IV diagnoses	**2.8**	**1.5**	***p*** **< .001**

Note. CI = confidence interval. Tob/alc = tobacco/alcohol. Any anxiety = one or more of the following diagnoses: GAD, social phobia, specific phobia, panic anxiety, or agoraphobia. Overall prevalence of diagnoses not included in "Any anxiety": PTSD (0.6%), OCD (3.6%).

[a] Computed in LogXact10 using penalized maximum likelihood estimation (Firth's method).

[b] Present for the last three months.

Table 4
Prevalence of psychiatric disorders and suicidal ideation related to different forms of maltreatment. OR compared to unexposed, adjusted for sex, age, and other forms of maltreatment.

Diagnosis (*n*)	Exposure to family violence (*n* = 21)		Exposure to community violence (*n* = 90)		Victim of family violence (*n* = 129)		Victim of community violence (*n* = 81)		Victim of sexual abuse or rape (*n* = 89)	
	% (95% CI)	OR (*p*)	% (95% CI)	OR (*p*)	% (95% CI)	OR (*p*)	% (95% CI)	OR (*p*)	% (95% CI)	OR (*p*)
AS (75/323)	30.0 (14.5, 51.9)	1.38 (.584)	24.1 (16.4, 34.1)	0.83 (.583)	**29.9 (22.6, 38.4)**	**2.0 (.015)**	27.5 (18.9, 38.1)	1.35 (.331)	27.3 (19.1, 37.4)	1.65 (.125)
ADHD (106/335)	**47.6 (28.3, 67.6)**	**3.3 (.025)**	33.3 (24.5, 43.6)	0.84 (.563)	27.1 (20.2, 35.4)	0.62 (.079)	34.6 (25.1, 45.4)	1.07 (.808)	**38.2 (28.8, 48.6)**	**2.0 (.019)**
CD (64/335)	0 (0, 15.5)[b]	–[a] ((.055)[c]	**32.2 (23.5, 42.4)**	**3.8 (<0.001)**	15.5 (10.3, 22.7)	0.91 (.766)	**32.1 (22.9, 42.9)**	**2.2 (.018)**	21.3 (14.1, 31.0)	2.2 (.053)
RAD (68/323)	15.0 (5.2, 36.0)	0.76 (.695)	18.4 (11.6, 27.8)	0.87 (.690)	21.3 (15.0, 29.2)	1.07 (.821)	23.8 (15.8, 34.1)	1.30 (.404)	26.1 (18.1, 36.2)	1.38 (.325)
MDD (78/335)	28.6 (13.8, 50.0)	0.86 (.794)	26.7 (18.6, 36.6)	1.28 (.474)	30.2 (23.0, 38.6)	1.70 (.068)	**32.1 (22.9, 42.9)**	**2.3 (.009)**	**41.6 (32.3, 52.5)**	**2.2 (.008)**
Dysth (35/335)	14.3 (5.0, 34.6)	0.62 (.532)	13.3 (7.8, 21.9)	1.41 (.439)	**17.1 (11.5, 24.5)**	**2.6 (.014)**	12.3 (6.8, 21.3)	1.53 (.325)	20.2 (13.2, 29.7)	2.1 (.071)
GAD (70/335)	**14.3 (5.0, 34.6)**	**0.22 (.036)**	27.8 (19.6, 37.8)	1.94 (.053)	**33.3 (25.8, 41.8)**	**4.1 (<0.001)**	**30.9 (21.9, 41.6)**	**2.4 (.008)**	**39.3 (29.8, 49.7)**	**3.5 (<0.001)**
Any anx (117/335)	**23.8 (10.6, 45.1)**	**0.26 (.027)**	40.0 (30.5, 50.3)	1.48 (.187)	**45.7 (37.4, 54.3)**	**2.4 (.001)**	**44.4 (34.1, 55.3)**	**1.82 (.036)**	**55.1 (44.7, 65.0)**	**2.7 (.001)**
Any diag (253/335)	85.7 (65.4, 95.0)	1.84 (.398)	80.0 (70.6, 87.0)	1.11 (.758)	81.4 (73.8, 87.2)	1.73 (.068)	**85.2 (75.9, 91.3)**	**2.3 (.020)**	**89.9 (81.9, 94.6)**	**3.8 (.001)**
Suic.th. (38/332)	9.5 (2.7, 28.9)	0.53 (.455)	12.2 (7.0, 20.6)	1.25 (.606)	**16.3 (10.9, 23.6)**	**2.1 (.039)**	12.3 (6.8, 21.3)	1.25 (.589)	19.3 (12.4, 28.8)	1.94 (.095)
Suicide attempt (118/332)	33.3 (17.2, 54.6)	0.43 (.127)	38.9 (29.5, 49.2)	1.20 (.554)	**46.5 (38.1, 55.1)**	**2.0 (.006)**	42.0 (31.8, 52.8)	1.61 (.099)	**54.5 (44.2, 64.5)**	**2.1 (.010)**

Note. CI = confidence interval; Dysth = dysthymia; Any anx = at least one of the following diagnoses: GAD, social phobia, specific phobia, panic anxiety or agoraphobia; Any diag = one or more diagnoses; Suic.th. = suicidal thoughts.

[a] Not estimated because of a zero cell count.

[b] Calculated using the Wilson score method.

[c] Computed in LogXact10 using penalized MLE (Firth's method).

Table 5
Comorbidity of psychiatric disorders including suicide attempts (adjusted for sex and age).

Comorbid diagnosis pairs	*n*	Maltreatment (*n* = 237) % (*n*)	No maltreatment (*n* = 98) % (*n*)	OR (95% CI)	*p*
CD + MDD	20/335	8.4 (20)	0 (0)	**23.2 (1.44, 375)**	**.027**[a]
CD + GAD	19/335	7.2 (17)	2.0 (2)	**4.92 (1.08, 22.33)**	**.039**
CD + suic	27/332	10.2 (24)	3.1 (3)	**3.49 (1.01, 12.09)**	**.049**
CD + RAD	16/323	6.5 (15)	1.1 (1)	**8.12 (1.03, 63.7)**	**.046**
CD + AS	15/323	4.8 (11)	4.3 (4)	1.40 (0.42, 4.66)	.585
CD + ADHD	27/335	8.0 (19)	8.2 (8)	1.23 (0.50, 2.99)	.651
GAD + MDD	39/335	15.6 (37)	2.0 (2)	**7.72 (1.80, 33.08)**	**.006**
GAD + suic	40/332	16.1 (38)	2.1 (2)	**7.40 (1.73, 31.70)**	**.007**
GAD + AS	25/323	10.0 (23)	2.2 (2)	**5.23 (1.19, 23.02)**	**.029**
GAD + RAD	22/323	9.1 (21)	1.1 (1)	**8.09 (1.06, 61.80)**	**.044**
GAD + ADHD	21/335	7.2 (17)	4.1 (4)	1.66 (0.53, 5.18)	.387
MDD + suic	46/332	17.8 (42)	4.2 (4)	**4.15 (1.42, 12.10)**	**.009**
MDD + AS	27/323	10.8 (25)	2.2 (2)	**4.88 (1.11, 21.32)**	**.035**
MDD + RAD	27/323	10.0 (23)	4.3 (4)	2.04 (0.67, 6.20)	.211
MDD + ADHD	30/335	11.0 (26)	4.1 (4)	2.58 (0.86, 7.75)	.090
AS + suic	27/320	10.9 (25)	2.2 (2)	**4.66 (1.06, 20.39)**	**.041**
AS + RAD	30/323	10.4 (24)	6.5 (6)	1.77 (0.69, 4.58)	.239
AS + ADHD	26/323	8.2 (19)	7.6 (7)	1.24 (0.49, 3.15)	.645
RAD + suic	29/320	11.3 (26)	3.3 (3)	3.16 (0.92, 10.91)	.068
RAD + ADHD	24/323	6.9 (16)	8.7 (8)	0.79 (0.32, 1.97)	.620
ADHD + suic	45/332	14.8 (35)	10.4 (10)	1.23 (0.57, 2.66)	.605

Note. Suic = suicide attempts.
[a] Computed in LogXact10 using penalized MLE (Firth's method).

or rape had significantly increased odds for ADHD, MDD, GAD, any anxiety, and for having at least one diagnosis. Suicidal ideation was associated with victims of family violence or sexual abuse. Our analysis shows that victims of family violence had significantly higher odds for having current suicidal thoughts and of having ever attempted suicide, while victims of sexual abuse or rape had significantly higher odds for having ever attempted suicide.

Comorbidity

The high mean number of diagnoses in this population (see Table 3) indicates a substantial level of comorbidity of psychiatric disorders. Table 5 shows the prevalence of pairs of psychiatric diagnoses, including suicide attempts. We found that most of the diagnosis pairs we studied were more prevalent in the group of maltreated adolescents and that the odds of several of the diagnosis pairs were significantly increased for the adolescents who reported maltreatment. In accordance with previous research, we expected to find comorbidity between MDD and GAD (Seligman & Ollendick, 1998). However, the odds of this combination were also significantly increased for adolescents who reported exposure to maltreatment (OR = 7.7, $p = .006$).

There were 20 subjects with the double diagnosis of CD/MDD. All 20 of these subjects were among the 237 maltreated adolescents. The OR was 23.2 (CI 1.44 to 375), $p = .027$. To check the robustness of this result, we carried out some additional analyses: the estimated OR and CI not adjusting for age and sex, using the penalized MLE with Firth's method, as well as the Gart adjusted logit method (Fagerland, Lydersen, & Laake, 2011), were similar (data not shown). In addition, we compared the proportions 20/237 vs. 0/98 using the unconditional z-pooled test as recommended previously (Lydersen, Langaas, & Bakke, 2012), using the software http://www4.stat.ncsu.edu/~boos/exact/. We obtained $p = .0030$, which is substantially lower than the *p*-value obtained from the logistic regression. Hence, we can be quite confident that the association between CD/MDD and maltreatment is not a false-positive finding.

Thus, we found that adolescents in the maltreated group had significantly increased odds of comorbidity between behavioral and emotional disorders, as demonstrated by the diagnosis pairs of CD/MDD, CD/GAD (OR = 4.9, $p = .039$) and CD/suicide attempts (OR = 3.5, $p = .049$), and between developmental and emotional disorders, as demonstrated by the diagnosis pairs of AS/MDD (OR = 4.9, $p = .035$), AS/GAD (OR = 5.4, $p = .025$) and AS/suicide attempts (OR = 4.9, $p = .035$). Thus, we found significant comorbidity between *different* categories of psychiatric disorders, such as emotional, developmental, and behavioral disorders, in the abused group.

Poly-victimization

Fig. 1 shows how the prevalence of several diagnoses increased when the number of experienced types of victimization increased. In this figure, we used the constructed victimization scale described earlier, which included the following items: witnessing violence, victim of family violence, victim of sexual abuse and household dysfunction. We found a significant

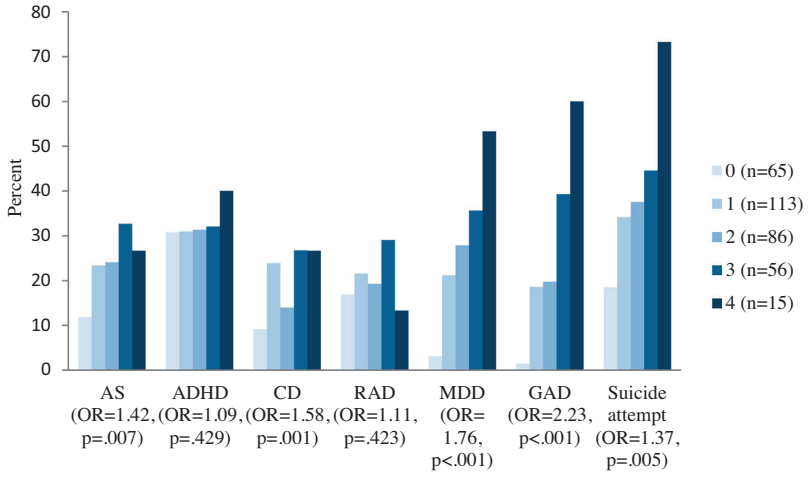

Fig. 1. Prevalence of psychiatric disorders according to number of types of victimization (OR for one unit increase in exposure, adjusted for sex and age). A victimization scale (0–4) was constructed, which included the following items: witnessing violence, victim of family violence, victim of sexual abuse, and household dysfunction.

relationship between an increasing number of victimization types and the prevalence of AS, CD, MDD, and GAD, as well as of having attempted suicide. Analyzing the number of experienced victimization types as a categorical variable, we found that those who had been exposed to all four adversities on our scale had an OR of 3.7 (95% CI: 0.87 to 15.6, $p = .077$) for having AS, an OR of 1.79 (95% CI: 0.54 to 6.0, $p = .343$) for having ADHD, an OR of 9.8 (95% CI: 2.1 to 45.4, $p = .003$) for having CD, an OR of 0.72 (95% CI: 0.14 to 3.9, $p = .702$) for having RAD, an OR of 25.8 (95% CI: 4.4 to 151.7, $p < .001$) for having MDD, an OR of 104.1 (95% CI: 10.7 to 1007, $p < .001$) for having GAD, and an OR of 7.6 (95% CI: 2.00 to 29.0, $p = .003$) for having attempted suicide compared with those without any experience of maltreatment.

Discussion

Among youths in residential care, the experience of childhood maltreatment is very common, and there is a high degree of poly-victimization. We found that psychiatric disorders and suicidal ideation were highly prevalent among those who reported exposure to maltreatment and that there was a high rate of comorbidity for psychiatric disorders. In accordance with previous research (Cater et al., 2014; Felitti et al., 1998), we found that the prevalence of several psychiatric disorders increased with an increasing number of types of exposure.

Prevalence

We found a very high prevalence of psychiatric disorders in our study sample of adolescents with a history of childhood maltreatment compared with the estimated prevalence in the general adolescent population in Norway of 8% (Heiervang et al., 2007). Four out of five had at least one psychiatric disorder. This was significantly more than adolescents without a history of maltreatment, and it shows that in this high-risk population, childhood maltreatment adds to the initially increased risk of psychiatric disorders. Compared to the study by McMillen et al. (2005), where they found that 47% of youth in congregate care met the criteria of at least one psychiatric diagnosis the past year, we found a higher prevalence of psychiatric disorders; however, they included only five DSM-IV diagnoses (PTSD, MDD, ADHD, mania and CD-ODD), and it is likely that this difference could at least partly explain the differences. The results are more comparable with the findings by Ford et al. in a British study of children in the foster care system, where 71% of children and adolescents in residential care met the criteria for a psychiatric disorder (Ford et al., 2007). They included somewhat younger children (5- to 17-year-olds) than in the present study. Our findings are significant, even though our reference group of adolescents without any reported exposure to maltreatment also had experienced childhood adversities and were placed in child welfare residential institutions. They had all been separated from their biological families, and most of them would also have experienced some degree of dysfunctional family living. We found significantly more AS diagnoses among youths with childhood maltreatment histories. As this is a neuropsychiatric disorder, one would expect that it would manifest prior to any maltreatment. However, it is also possible that a history of child maltreatment could cause symptoms that later could be interpreted as AS. If the symptoms were present prior to the maltreatment, this might suggest that children with AS are more prone to be exposed to abuse. Table 4 shows significantly increased odds for AS in the group of adolescents reported to be victims of family violence. This again might suggest that some families could have difficulties coping with the challenges of having a child with AS and

be more prone to use physical violence against the child. One could ask if more extensive guidance and support of these parents could have prevented some of this violence.

Emotional disorders, including suicidal ideation, were especially prevalent among youths with childhood maltreatment histories. The prevalence of MDD (29.1%) exceeds far beyond the prevalence in the general adolescent population in Norway (2.6%). When the traumatic childhood is considered in more detail (Table 4), more patterns of disease become visible. GAD was highly prevalent in all subgroups of maltreated adolescents, and the odds for GAD were significantly elevated for every one of the exposures we studied, except exposure to community violence ($p = .053$), regardless of the other types of maltreatment that the adolescent had experienced. Depressive disorders and suicidal ideation were linked to maltreatment types in which the child was the victim of violence (in family or community) or sexual abuse but not to the witnessing of violence. In this population of adolescents in residential care, it seems that being the physical target of an abusive act increases psychiatric morbidity more than witnessing others being victimized.

The prevalence of PTSD in this study was very low, considering the comprehensive amount of trauma exposure in this population. There is a broad spectrum of possible symptoms of childhood trauma. Whether and how the individual child expresses symptoms depends on a number of different aspects, such as the resilience of the child, the social and family environment, age, developmental stage, and type of trauma. A single traumatic event in an otherwise safe environment will cause different reactions than repeated chronic maltreatment (Terr, 1991). The traumatic experiences of the individuals in this study would typically be chronic and repeated trauma rather than single events and would be more likely to cause a broader spectrum of symptoms. Thus, it might be that the consequences of trauma in this population are expressed through other symptoms and disorders, such as emotional or behavioral difficulties and disorders; however, further research is needed to clarify the paths from potential traumatic events to the final shaping of mental disorders in children and adolescents.

The odds for CD were significantly increased in youths exposed to community violence, both as witnesses and victims. The reason might well be that adolescents with CD are frequenting violent and aggressive environments more than others are and, therefore, are more exposed to this violence themselves. There is also an association between victims of community violence and emotional disorders. This study cannot answer questions of direction of causality, but it is possible that adolescents with CD expose themselves to aggressive environments and that the subsequent exposure to community violence makes them more vulnerable to the development of emotional disorders.

Comorbidity

When investigating the comorbidity of psychiatric disorders in this population, we found that the adolescents in the maltreatment group had significantly increased odds for several diagnosis pairs. We find it especially interesting that there were significantly increased odds for the diagnosis pairs CD/MDD, CD/GAD, and CD/suicide attempts in this group. Residential care units are typically specialized in caring for children and adolescents either with or without behavioral problems (The Norwegian Directorate for Children, Youth and Family Affairs, 2013). Thus, there exists units designed for adolescents coping with behavioral problems and others designed for adolescents without behavioral problems. Most institutions are not well prepared to care for and cope with adolescents with both behavioral and emotional disorders (The Norwegian Child Protection Act. Regulation on quality and internal control in child welfare institutions (in Norwegian)). This might cause unnecessary difficulties for the youths in question, and if they are placed in the wrong institutions, they may be exposed to rules and principles not suited to enhance their development and healing. Further, our findings suggest that former exposure to maltreatment might be the key mechanism for the observed higher comorbidity between emotional disorders and CD. There has been an increase in knowledge about the treatment of externalizing disorders in recent years. Some of these treatment programs include trauma-informed modules and could be considered in this setting (Brown, McCauley, Navalta, & Saxe, 2013; Greenwald, 2002; Hodgon, Kinniburgh, Gabowitz, Blaustein, & Spinazzola, 2013). As specific trauma therapeutic interventions are available, they should play a more important role in a holistic treatment approach for residents with high emotional/behavioral comorbidity.

Poly-victimization

A higher number of experienced types of victimization corresponded with a higher prevalence of several psychiatric disorders, such as MDD, GAD, CD, and AS, as well as with previous suicide attempts. The impact of poly-victimization is clearly striking when some specific diagnoses are considered. For instance, the overall prevalence of GAD (20.9%) and MDD (23.3%) in the study population was quite high, but the odds for GAD increased more than 100-fold and the odds for MDD increased 26-fold when all four exposures on our victimization scale were reported. These findings clearly underline the importance of a broad and systematic trauma history assessment in high-risk populations, such as those in the present study. They are also in accordance with previous research and thereby contribute to validating the way we categorized the different groups of self-reported maltreatment using the CAPA in the present study.

Strengths and Limitations

This study is unique in that it is based on a large nationwide sample of high-risk adolescents. The sample size and high prevalence of risk factors made it possible to investigate associations that are more difficult to find in other minor samples.

We also had a good response rate of 67%. Because we had available CBCL scores for all participants, and also for 141 non-participants, the estimated and observed prevalence rates could be compared. The estimated prevalence rates of psychiatric diagnoses showed only a small deviance from the observed prevalence rates, and therefore, we consider the results to be regarded as representative for the entire population of adolescents in Norwegian residential care units. Psychiatric health was assessed with diagnostic interviews by trained research assistants, making it possible to study actual DSM-IV diagnoses, including onset and impact criteria during the last three months, rather than just the problem areas. The main limitation of this study is that we did not have any information about experiences of neglect or emotional or verbal abuse in the study population. Neglect (either emotional or physical) and emotional and verbal abuse are common forms of child maltreatment and substantial risk factors for psychiatric problems and disorders (Cater et al., 2014; Lehmann et al., 2013; Mills et al., 2013); however, previous research has shown that the risk of experiencing different types of adversities increases when an individual has been exposed to a single type (Felitti et al., 1998). Therefore, it is likely that the adolescents who reported exposure to maltreatment also had experienced more neglect than the adolescents in our reference group. Further, in Norway, the official policy in child protection is that foster care is the preferred form of placement and residential youth care is a last resort (Backe-Hansen, Bakketeigen, Gautun, & Grønningsæter, 2011). Thus, we presume that almost all in our investigated high-risk population at least had experienced one form for neglect. Thus, our results might be underestimated rather than overestimated. We did not have information regarding the number of times each adolescent had been exposed to each type of maltreatment. It is likely that chronic and repeated exposure to abuse is more detrimental than a single traumatic event and that a quantitative measure, in addition to the items on the scale used in this study, would enhance the differences shown in our results. We did not have the opportunity to include the adolescents' parents as informants, thereby limiting our knowledge about early development and family functioning before placement in RYC. Thus, the requirement in some diagnoses, such as RAD, for developmental continuity and early onset could not be used. The information about experienced maltreatment was only collected from the adolescents themselves. It is possible that this might cause some degree of recall bias. Retrospective studies of adults reporting childhood maltreatment are found to contain some false-negative reports, but few false positives (Hardt & Rutter, 2004). Because of the shorter timeline, it is reasonable to believe that there would be even less bias in the reports of adolescents, though we cannot completely rule out the possibility of some false-negative reports arising from the reluctance to speak in the interview setting. Because of the retrospective design of the study, it is not possible to draw conclusions about causation of the associations between exposure to maltreatment and psychiatric disorders. However, because of the broad diversity of psychiatric disorders and problems associated with childhood maltreatment in this study, as well as the high prevalence of psychiatric disorders, we found it important to assess both issues, regardless of the direction of causality.

Implication for Clinical Practice

There are no universal guidelines on how to treat patients with psychiatric disorders in the context of childhood maltreatment, but the comprehensive neurobiological research of recent years has established a broad base of knowledge and understanding of how early-life stressors, such as childhood maltreatment, modify neurobiological structures and contribute to increased psychiatric morbidity (Heim, Newport, Mletzko, Miller, & Nemeroff, 2008; McCrory, De Brito, & Viding, 2011; Murgatroyd & Spengler, 2011). Previous research suggests that psychiatric disorders in the context of a history of childhood maltreatment have a different pathophysiological basis than psychiatric disorders without a history of childhood maltreatment (Heim et al., 2008; Heim, Shugart, Craighead, & Nemeroff, 2010; Teicher & Samson, 2013). Further, with regards to depression, it has been shown that a history of childhood maltreatment increases the risk of recurrent and persistent depression and of poor treatment outcome (Nanni, Uher, & Danese, 2012; Shamseddeen et al., 2011).

Childhood maltreatment is a major global problem, and based on the prevalence of experienced maltreatment in the present study (71%) and the prevalence of childhood maltreatment in a Norwegian clinical sample (60.2% including neglect) (Reigstad et al., 2006), children in residential care units seem to have experienced more childhood maltreatment than other children. Our study demonstrates that these children are at high risk of developing psychiatric disorders and are also at high risk of developing comorbid psychiatric disorders. In recent years, there has been a trend and a goal within child and adolescent psychiatric services in Norway toward offering more short-term treatment in out-patient settings and limiting stays at hospital wards (Commissioner's Document (in Norwegian), 2015). We are concerned that this policy might contribute to inadequate health care services for the high-risk population of adolescents in residential youth care. We have shown that adolescents in residential care units have a complex history of childhood adversities, and our results indicate that exposure to maltreatment accounts for part of their increased psychiatric morbidity and comorbidity. We would recommend that a thorough assessment of trauma history is completed for all children and adolescents entering residential youth care. The high prevalence of psychiatric disorders and comorbidity demands an easy and immediate access to child and adolescent psychiatric services, and once they are admitted, a thorough assessment of psychiatric disorders. The complexity of the clinical outcomes revealed in this study also suggests that longer-term treatment plans and follow-up by psychiatric services might be needed to a greater extent than for the rest of the child and adolescent population.

When treating a patient living in residential youth care, it is essential for the clinician to know how to weigh the adolescent's experience of adversities and the impact this might have on the development of disease and outcome of treatment. Although there is still a need for further research regarding treatment options for patients with psychiatric disorders and histories of childhood maltreatment, there are several evidence-based trauma treatment methods available from which

the patient can benefit, for instance Trauma Focused Cognitive Behavioral Therapy (TF-CBT), Dialectical Behavior Therapy (DBT) and Eye Movement Desensitization and Reprocessing (EMDR). There are also some programs that take into account the special setting when the patient lives in a residential care unit (Brown et al., 2013; Hodgon et al., 2013). While primary and secondary prevention of childhood abuse is the primary goal, it is also essential to provide tertiary prevention through delivering the best possible assessment, care, and treatment for those who have already been exposed. To accomplish this, a close collaboration between child welfare services and child and adolescent psychiatry is necessary.

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Paper II

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Health and Quality of Life Outcomes

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Child maltreatment and quality of life: a study of adolescents in residential care

Hanne Klæboe Greger[1,4*], Arne Kristian Myhre[2,3], Stian Lydersen[4] and Thomas Jozefiak[1,4]

Abstract

Background: Childhood maltreatment is an important risk factor for mental and physical health problems. Adolescents living in residential youth care (RYC) have experienced a high rate of childhood maltreatment and are a high-risk group for psychiatric disorders. Quality of life (QoL) is a subjective, multidimensional concept that goes beyond medical diagnoses. There is a lack of research regarding the associations between childhood maltreatment and QoL. In the present study, we compare self-reported QoL between adolescents in RYC in Norway with and without maltreatment histories, and adolescents from the general population. We also study the impact of number of types of adversities on QoL.

Methods: Adolescents aged 12–23 years living in RYC in Norway were invited to participate in the study; 400 participated, yielding a response rate of 67 %. Maltreatment histories were assessed through interviews with trained research assistants, and completed by 335 adolescents. Previous exposure to maltreatment was reported by 237 adolescents. The Questionnaire for Measuring Health-Related Quality of Life in Children and Adolescents (KINDL-R) was used. Nonexposed peers in RYC ($n = 98$) and a sample of adolescents from the general population ($n = 1017$) were used for comparison. General linear model analyses (ANCOVA) were conducted with five KINDL-R life domains as dependent variables. Linear regression was used to study the effect of number of types of adversities.

Results: Exposed adolescents in RYC reported poorer QoL than peers in control groups. Compared with nonexposed peers in RYC, the 95 % confidence intervals for mean score differences on the KINDL-R subdomains (0–100 scale) were 1.9–11.4 (Physical Well-being), 2.2–11.1 (Emotional Well-being), −0.7–10.0 (Self-esteem), and 1.8–10.9 (Friends). Compared with the general population sample, the 95 % confidence intervals for mean score differences were 9.7–17.6 (Physical Well-being), 7.9–15.3 (Emotional Well-being), 3.6–12.5 (Self-esteem), and 5.3–12.8 (Friends). Number of types of adversities was associated with a poorer QoL score on all subdomains (Physical- and Emotional Well-being, Self-esteem, Friends, and School).

Conclusions: Childhood maltreatment was associated with a poorer QoL score. We suggest the use of QoL and maltreatment measures for all children and adolescents in RYC.

Keywords: Child abuse, Maltreatment, Adolescents, KINDL-R, Quality of life, Residential care

Background

Child maltreatment can have devastating effects for those exposed. International research has revealed an increased risk of reduced self-reported health and life satisfaction [1, 2] and increased prevalence of migraines [3], overweight [4], asthma [5], gastrointestinal illness [6], and psychosocial problems, including reduced school functioning, in adolescence and in early adulthood in individuals with child maltreatment histories, such as physical abuse, sexual abuse, and witnessing violence [7–9]. Adolescents and adults who have been exposed to maltreatment during childhood are also at increased risk of a broad spectrum of psychiatric illnesses, such as depression, anxiety, suicide ideation, eating disorders, conduct disorders, and drug abuse [10–14]. In addition, there is a growing body of literature showing that polyvictimization increases the risk of several psychiatric disorders and symptoms [14–16].

* Correspondence: hanne.k.greger@ntnu.no
[1]Department of Child and Adolescent Psychiatry, St. Olavs Hospital, Pb 6810 Elgeseter, 7433 Trondheim, Norway
[4]Norwegian University of Science and Technology (NTNU), Faculty of Medicine, RKBU Central Norway, Pb 8905 MTFS, 7491 Trondheim, Norway
Full list of author information is available at the end of the article

Reported prevalence rates of childhood maltreatment vary in different studies and in different countries. In the Norwegian general population, studies have reported a prevalence of physical abuse of 5–6 % (both sexes) and sexual abuse of 10–14 % (girls) and 3–4 % (boys) [17, 18]. In a meta-analysis of child sexual abuse prevalence in European countries from 2011, similar results are reported (14 % of girls and 6 % of boys) [19]. However, the Adverse Childhood Experiences (ACE) study in the United States found higher rates of maltreatment, with a prevalence of childhood physical abuse of 27 % (girls) and 30 % (boys), and a prevalence of child sexual abuse of 25 % (girls) and 16 % (boys) [20]. The childhood prevalence of witnessing intimate partner violence in high-income countries has been estimated as 8–25 % [21].

Adolescents in residential youth care (RYC) are at high risk of developing psychiatric disorders [22, 23]. In a recently published article, we found that the maltreated adolescents in RYC had a very high prevalence of psychiatric diagnoses (80 %) compared with the nonmaltreated adolescents (64 %) in RYC, and that exposure to increasing numbers of types of childhood adversities significantly increased the risk of having several psychiatric diagnoses according to the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) [24]. It has also been shown that mental health problems are associated with poorer quality of life (QoL) [23, 25], and that adolescents in RYC report poor QoL [26]. The World Health Organization (WHO) defines QoL as "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" [27]. In children, this would include the child's own experiences across several life domains, such as physical and emotional well-being, self-esteem, and the child's relationship to family, friends, and school [28]. The WHO highlights that the concept of QoL is subjective and multidimensional. Therefore, self-reports are the gold standard of QoL assessment. However, in this study, we have chosen to include proxy reports of QoL as well, for additional information. Even though psychiatric and somatic symptoms and disorders are related to the individual's QoL, the term does not address psychopathology directly, but rather the impact of psychopathology on subjective perceived daily function. It also includes other factors, such as self-esteem and the person's relationship to family, friends, and school. Previous studies have shown that QoL and psychopathology are distinct features, and that it is possible to improve QoL measures even with persistent high levels of psychopathology [29]. Improvement in QoL or daily function provides an alternative outcome goal for clinicians working with children and adolescents with chronic psychiatric or somatic disorders. Adolescents in RYC with child maltreatment histories are at high risk of developing problems in several life domains, and it can be challenging to find the most beneficial treatment or prevention programs for each individual. The use of QoL measures could give important information that would go beyond the diagnosis of disease, and suggest which life domain could be targeted for interventions and improvement of functioning. As the caregivers of all children and adolescents in out-of-home care, child welfare services are responsible for providing safe environments and looking after the health of the children in their care. Considering existing research on maltreatment, one would therefore expect that child well-being should be of great interest to child welfare services. However, while there has been an increasing amount of research regarding the mental health of children in out-of-home care, research on the QoL of children in out-of-home care has been very sparse [26].

The previous research on the QoL of maltreated children and adolescents has also been very limited [30]. In a recently published review, Weber et al. concluded that there is a consistently negative association between child maltreatment and both self- and proxy-reported QoL. They also found that the number of types of maltreatment and QoL were negatively related, although the studies that had investigated this all assessed adult survivors rather than children [31]. A recent study of Swedish 15-year-old school children found a dose–response relationship between the number of types of abuse (not including sexual abuse) and a decrease in a QoL measure [32]. In a study of Chinese adolescents, Chan reported that youth exposed to polyvictimization reported poorer health-related QoL than non-victimized peers [33]. In a large study of high school students in Kuwait, Al-Fayez et al. reported significantly poorer QoL in students exposed to maltreatment [34]. A few other studies have focused on the QoL of maltreated children and the QoL of adults who have experienced childhood maltreatment. Adult survivors of childhood maltreatment have shown significant loss of health-related QoL and of remaining quality-adjusted life years [35, 36]. Lanier et al. reported that children who received child welfare services as a follow-up to a report of child abuse or neglect had significantly lower QoL scores compared with a normative reference group [37]. A Swiss study of the health-related QoL of young maltreated children (mean age 8 years) also showed a significantly impaired QoL among maltreated children compared with matched controls [38].

The existing lacuna in research on QoL in RYC adolescents with maltreatment histories is of major concern because such knowledge could illuminate the life

domains that could be targets for intervention and used to support the adolescent beyond the assessment and treatment of psychopathology. The primary aim of this study was to assess the QoL of adolescents in RYC units who have reported previous experience of maltreatment, and to compare them with adolescents in the same RYC units without this experience, and with adolescents from the general population. We also wanted to study the impact of the number of types of adversities on QoL scores for different subdomains. In addition to adolescent self-reports, proxy reports by primary contacts were assessed as a supplement.

Method

Participants and recruitment

The study sample

The data for this study were obtained from the Norwegian research project, Mental Health in Adolescent Residents in the Child Welfare System [22]. All residential care units providing care for adolescents aged 12–23 years in Norway were invited to participate in the study (Fig. 1). Unaccompanied minors without asylum in Norway and adolescents on acute placement were excluded from the study because they were considered to be in such a high state of crisis that data collection should not be prioritized. Insufficient Norwegian language ability was another exclusion criterion. A total of 86 of the 98 invited institutions agreed to participate in the study, and 400 of the 601 eligible adolescents participated, giving a response rate of 67 %. Of those included in the study, 335 youths completed the psychiatric interview, yielding information about child maltreatment histories. Child Behavior Check List (CBCL) scores were available for the participants, as well as for 141 anonymous nonparticipants. These data made it possible to estimate complete DSM-IV diagnoses for 541 adolescents using Bayesian multiple imputation estimation [22]. Estimated prevalence rates of psychiatric diagnoses showed only a small deviance from the observed prevalence rates, which were based on completed psychiatric interviews, thereby confirming the representativeness of the 335 youths who completed the psychiatric interview. For further details, see Greger et al. [24] and Jozefiak et al. [22].

The general population reference sample

As a comparison group, we used a study sample of students from 4th to 10th grade from schools in Sør-Trøndelag county, which is a geographical area representative of Norway in general, with both urban and rural settlement. In this study, 61 school grade cohorts in the chosen geographical area were randomly selected (a school grade cohort was defined as all pupils enrolled in a specific grade at a single school). Students with limited Norwegian language skills or with a low academic developmental level were excluded. Students in the 4, 6, 8 and 10th grades were invited to participate in the study, and 1997 students were finally included, resulting in a response rate of 71.2 %. For the present study, only data from students aged 12 years and older were used (Table 1). Students and their parents completed the KINDL-R (see below) independently. For further details, see Jozefiak et al. [39].

Procedures

Data collection was conducted by research assistants who visited the institutions and completed structured psychiatric interviews with adolescents and their primary contacts, and collected questionnaires from adolescents, primary contacts, and leaders of the institutions. Four trained interviewers were used; they had been educated in relevant fields (Master's degrees in psychology/social work, one Bachelor's degree in mental health, and a nurse who specialized in mental health) and had extensive prior experience working with children and families. During the whole period of data collection, a team of child and adolescent psychiatrists and psychologists was on call in case of emergencies. Data were collected from June 2011 until July 2014.

Instruments

Child and Adolescent Psychiatric Assessment (CAPA)

The CAPA is a semistructured psychiatric interview designed to gather information from children and adolescents [35]. The CAPA uses a computer-based algorithm for diagnostic evaluation, which results in DSM-IV diagnoses. It also contains questions about child abuse history. The following specific items from the CAPA were used to extract the data of interest for this study:

(1) *Witness of violence* – Person saw or heard but was not the object of an event with potential for life threatening or severe physical injury, including seeing someone shot or killed, hearing someone raped or beaten in an adjacent room, or seeing another person be killed or severely injured in an accident.
(2) *Victim of violence in the community* – Subject has been the victim of physical violence, with one or more people (not a family member) using force against them with potential to cause death or serious injury. Force may have been used in order to get something (e.g., mugging or robbery), or to intimidate or frighten the subject, or for its own sake (assault, fight, or torture). Victim may have been threatened with a weapon.

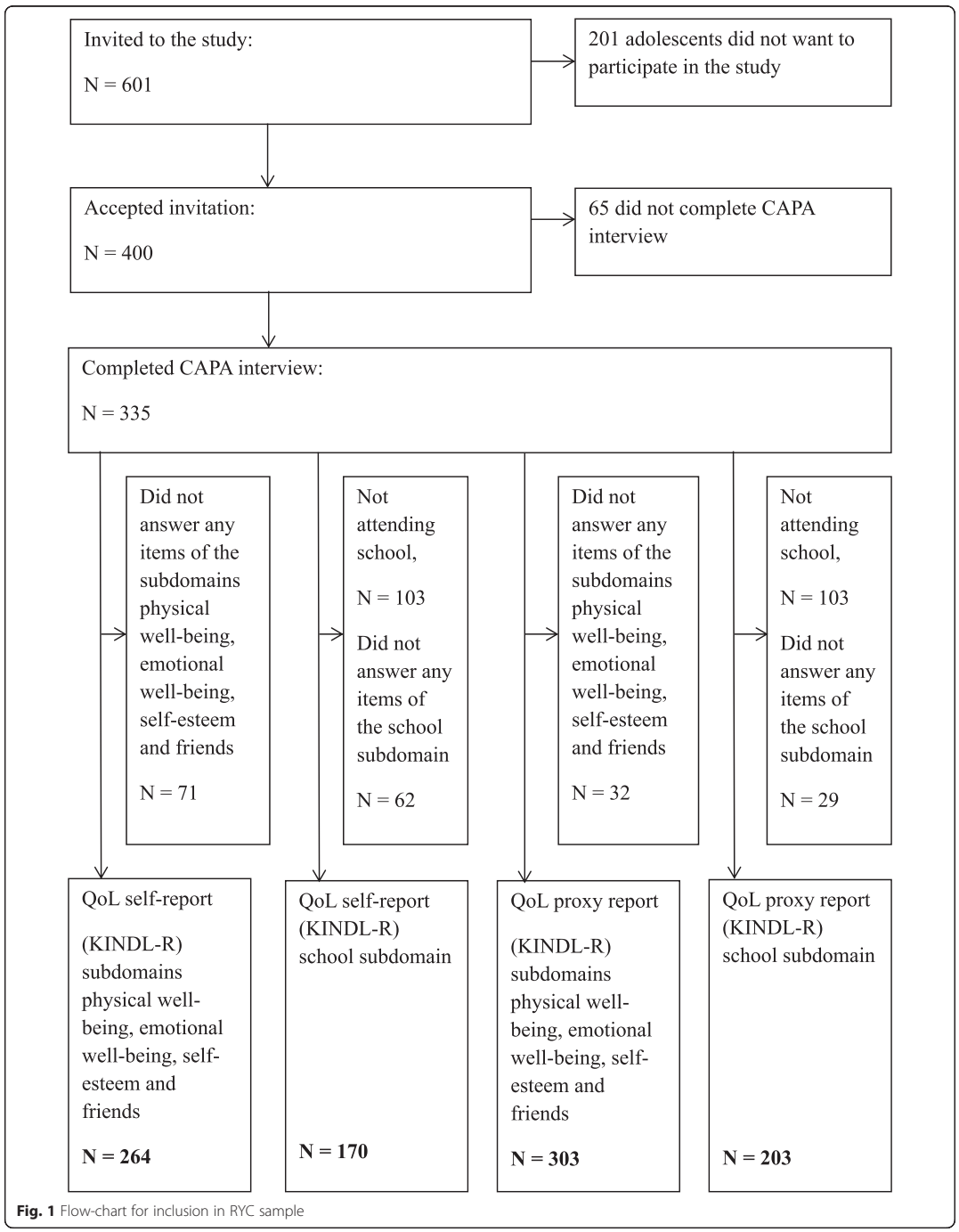

Fig. 1 Flow-chart for inclusion in RYC sample

Table 1 Characteristics of the study sample and reference groups

	Adolescents in RYC reporting exposure to maltreatment	Adolescents in RYC reporting no exposure to maltreatment	General population
Number	237	98	1017
Age (years)			
Mean (SD)	17.0 (1.31)	16.5 (1.30)	14.1 (1.02)
Range	12–20	12–19	12–17
Sex			
Girls	64.6 %	43.9 %	49.5 %
Mean number of placements out of family home	3.6	2.9	
Mean age at first placement, years	12.8	12.0	
Witnessing violence	38.4 %	0 %	
Victim of physical violence, family	54.4 %	0 %	
Victim of physical violence, community	34.2 %	0 %	
Sexual abuse	37.6 %	0 %	
Household dysfunction	66.7 %	46.9 %	
>1 type of childhood adversity[a]	66.2 %	0 %	

Note: [a] Types of adversities defined by witnessing violence, victim of family violence, sexual abuse, household dysfunction

(3) *Victim of family violence* – Subject has been the victim of physical abuse by a member of the family.
(4) *Victim of sexual abuse* – Sexual abuse episode(s) in which a person ("the perpetrator") involved the child or adolescent in activities for the purpose of the perpetrator's own sexual gratification. Activities included kissing (that made the person uncomfortable), genital fondling (over or under clothing), oral–genital or oral–anal contact, genital or anal intercourse, or use of instruments. Sexual abuse does not include medical exams or mutually desired sexual relations with a peer.

All participants who indicated that they had experienced at least one of these types of maltreatment were included in the exposed group ($n = 237$). The participants that did not respond positively to these questions were used as a reference group of adolescents in residential care ($n = 98$).

Childhood adversity scale: measuring the impact of number of types of adversities

One of the aims of this study was to investigate the impact of number of types of adversities on different aspects of QoL. We constructed a modified scale based on the ACE questionnaire [40], where the number of maltreatment types we had registered, including household dysfunction, was added. The term "household dysfunction" will hereafter represent parental psychopathology, criminality, or alcohol or substance abuse. Confirmatory factor analysis was conducted, and after excluding the variable "victim of violence in the community," our scale showed a one-factor structure with good model fit to the data: root mean square error of approximation (RMSEA) = 0.00 with a 90 % confidence interval (CI) of 0.00 to 0.08, comparative fit index (CFI) = 1.00, and Tucker–Lewis index (TLI) = 1.00. Thus, a scale (range 0–4) describing the load of childhood adversities was developed, and consisted of the variables of witnessing violence, victim of family violence, victim of sexual abuse, and household dysfunction. The procedure is described in more detail elsewhere [24].

Quality of life (QoL)

The Kinder Lebensqualität Fragebogen (Questionnaire for Measuring Health-related Quality of Life in Children and Adolescents, revised version, KINDL-R) is a well-established QoL instrument for children aged 8–16 years used in several clinical and epidemiological studies. A parent-proxy version is available. The questionnaire consists of 24 items and six subscales: Physical Well-being, Emotional Well-being, Self-esteem, Family, Friends, and School. Each item addresses the child's experience over the past week, and is rated on a 5-point scale (1 = never, 5 = always). Mean item scores are calculated for all subscales and transformed to a 0–100 scale, with 100 indicating very high QoL. Psychometric testing of the KINDL-R revealed good scale utilization and scale fit as well as moderate internal consistency [41]. A Norwegian normative study also confirmed satisfactory internal consistency (alpha = 0.69 to 0.81 for the subscales for 10th graders) and satisfactory test–retest reliability [39]. In our study, there was a large structural missing percentage on the school subscale due to the fact that 29 % of the adolescents in the present study did not attend school. Also, the items of the family subscale, which asked about experiences relating to family life over the past week, did not fit the target group of the present study, and were therefore not applied. Thus, five subscales of the KINDL-R were used in order to measure aspects of QoL.

Child Behavior Checklist (CBCL)

The Child Behavior Checklist (CBCL) 6–18 [42] was used for an attrition analysis of the KINDL-R and to assess the relationship between psychopathology and QoL. The CBCL provides comprehensive clinical information

concerning emotional and behavioral problems of the child in several domains: total problems, and internalizing and externalizing "syndromes." The primary contact reported on the adolescent's emotional and behavioral problems over the preceding 6 months. The CBCL total problems scale consists of 118 items scored on a 0–2 scale; 0 = "Not True"; 1 = "Somewhat or Sometimes True"; 2 = "Very True or Often True," with a total score range of 0–236. The Norwegian translation of the CBCL has shown satisfactory reliability and validity [43, 44].

Representativeness of the sample

An attrition analysis was conducted to see if there were any significant differences between participants who had completed the KINDL-R self-report ($n = 264$), and those who had not ($n = 136$) out of the total of 400 participants in the study. This was done by comparing scores on the internalizing and externalizing problem subscale scores of the CBCL. Complete CBCL scores for 240 of the participants with KINDL-R self-reports were available. For those without a completed KINDL-R self-report, the internalizing problem score was available for 114, and the externalizing problem score was available for 116 participants. The results showed no significant difference in the externalizing problem score (mean difference 2.37, $p = 0.096$). There was a significant difference in the internalizing problem score (mean difference 2.35, $p = 0.036$), suggesting that those who did not complete the KINDL-R self-report had a slightly higher internalizing problem score than the rest. However, the mean difference was small compared with the total range on the internalizing problem score of the CBCL (0–64).

Missing values

Out of the initial 400 participants, 335 completed the CAPA interview, which was used to categorize them according to child maltreatment history. The KINDL-R data files were studied separately for self and proxy reports, and because of the high rate of youth not attending school, this subscale was studied separately from the rest. Participants who did not answer any of the questions were excluded, resulting in the inclusion of 170 respondents for the self-report school subdomain and 264 self-report respondents for the remaining four subdomains. The corresponding proxy reports resulted in 203 respondents for the school subdomain and 303 respondents for the remaining four subdomains. Among these, there were 0.6 to 2.4 % missing values for the self-report school subdomain (four items), 0.4 to 6.1 % for the remaining self-report subdomains (16 items), 0.5 to 2.5 % for the proxy-report school subdomain (four items), and 0.7 to 3.3 % for the remaining proxy-report subdomains (16 items). These missing values were singly imputed, using the expectation-maximization algorithm.

Statistical analysis

KINDL-R subscale scores for the three groups of adolescents were compared using a general linear model (ANCOVA). Pairwise comparisons were carried out, combining the global F-test with a local least significance difference test to preserve the familywise error rate (FWER) [45]. To compare the KINDL-R subscale scores with the self-reported number of types of adversities, we used linear regression with the latter as an independent variable. Linear regression was also used to study the effects of categories of childhood adversities on KINDL-R subdomains. Both ANCOVA and linear regression were adjusted for age and sex. Confidence intervals for Pearson's correlation coefficient were based on the Fisher z-transformation. Correlation coefficients of 0–0.29 were considered small, 0.3–0.59 moderate, and 0.6–1 high. Results were considered statistically significant with a two-sided p-value <.05. Analyses were carried out in SPSS (v. 21; IBM SPSS).

Ethics

The Norwegian Regional Committee for Medical and Health Research Ethics approved the present study and the main research project, Mental Health in Adolescent Residents in the Child Welfare System (number of reference 2013/1128/REC Central). Written informed consent was obtained, and if the participant was under 16 years of age, consent from the guardian was also obtained. To avoid making participants feel pressured to participate, the head of the institution received detailed oral and written information about the research project. A six-page standardized information/invitation letter was distributed to the adolescents, and had previously been approved by the Committee for Medical and Health Research Ethics. This information letter described in detail, using simple language, the kind of information to be assessed. It was emphasized that participation in the project was voluntary, that the adolescent did not need to complete all the questions, and that the participant could retract her or his consent at any time. When the research assistant arrived at the institutions the same information was given once again orally to ensure that the adolescent gave informed, voluntary consent to participate in the study.

Results

Table 1 shows the general characteristics of the adolescents in RYC units and in the general population.

Two hundred and thirty-seven adolescents reported exposure to maltreatment, including witnessing violence. Among the adolescents in RYC, the childhood adversity score varied from 0 to 4 (mean = 1.53, SD = 1.12, median = 1).

Table 2 shows the correlation between each of the five subscales on the KINDL-R self-report and the internalizing and externalizing problem scores on the CBCL reported by the primary contact at the unit. As shown, there is a significant small-to-moderate negative correlation between internalizing problems and all five KINDL-R subscales. For the externalizing problem score on the CBCL, we found a small but significant negative correlation between externalizing problems and Friends, Physical Well-being, and Emotional Well-being, but not between externalizing problems and Self-esteem or School.

Table 3 shows the associations between single categories of childhood adversities and KINDL-R subdomains. Sexual abuse has the strongest association with all five subdomains, and is statistically significant also when adjusted for the other categories of childhood adversities for all but one subdomain (self-esteem). The association between household dysfunction and the subdomains Physical and Emotional well-being is prominent. However, both sexual abuse and household dysfunction display a borderline statistically significant association with the subdomain Self-esteem.

QoL self-reports represent the gold standard for measuring adolescents' QoL. As shown in Fig. 2, adolescents in the maltreatment group evaluated their QoL to be lower on all five subdomains of the KINDL-R. The only results of the overall analysis that were not statistically significant were for the School subdomain. Except for the Self-esteem subdomain, the maltreatment group scores were significantly lower than the reference group in RYC units on all subscales (p <0.05). Compared with nonexposed peers in RYC, the 95 % confidence intervals for mean score differences on KINDL-R subdomains (0–100 scale) were 1.9–11.4 (Physical Well-being), 2.2–11.1 (Emotional Well-being), −0.7–10.0 (Self-esteem), and 1.8–10.9 (Friends). Compared with the general population sample, the 95 % confidence intervals for mean score differences were 9.7–17.6 (Physical Well-being), 7.9–15.3 (Emotional Well-being), 3.6–12.5 (Self-esteem), and 5.3–12.8 (Friends). The effects of number of types of adversities are illustrated in Fig. 3. There was a significant decrease in QoL scores for all five subdomains as the number of types of childhood adversities increased.

The proxy reports were scored by the adolescent's primary contact at the institution, who was the adult with the closest daily-life relationship to the individual youth. Figure 4 shows a significantly lower score for adolescents in both the maltreated and the nonmaltreated group compared with the general population. There were no significant differences between the two groups of adolescents in RYC, in contrast to the results of the self-reports. The differences between the QoL assessments by the adolescents themselves and by their primary contacts in RYC are even more profound regarding number of types of adversities, as illustrated in Fig. 5. We found no significant differences in the QoL score according to the number of types of childhood adversities on the proxy reports.

Discussion

Adolescents in RYC with child maltreatment histories reported significantly poorer QoL than peers in RYC without maltreatment histories. We also found a

Table 2 Correlation between KINDL-R subdomains and CBCL internalizing and externalizing problems. Correlation coefficient (r) with 95 % confidence intervals

	1	2	3	4	5	6	7
1. Self-esteem	-						
2. Physical well-being	0.562 (0.473 to 0.639)	-					
3. Emotional well-being	0.652 (0.577 to 0.716)	0.560 (0.471 to 0.638)	-				
4. Friends	0.412 (0.307 to 0.507)	0.298 (0.184 to 0.404)	0.475 (0.376 to 0.563)	-			
5. School	0.496 (0.373 to 0.601)	0.449 (0.320 to 0.561)	0.486 (0.362 to 0.593)	0.360 (0.221 to 0.484)	-		
6. CBCL internalizing problems	−0.268 (−0.382 to −0.146)	−0.429 (−0.527 to −0.320)	−0.347 (−0.454 to −0.231)	−0.291 (−0.403 to −0.171)	−0.223 (−0.367 to −0.068)	-	
7. CBCL externalizing problems	−0.068 (−0.193 to 0.059)	−0.193 (−0.312 to −0.068)	−0.188 (−0.307 to −0.063)	−0.143 (−0.265 to −0.017)	−0.131 (−0.282 to 0.027)	0.378 (0.285 to 0.464)	-

Table 3 Associations between categories of childhood adversities and KINDL-R subdomains

	Witnessing violence		Victim of physical violence, family		Sexual abuse		Household dysfunction	
KINDL-R subdomain	B (95 % CI)	Multiadj. B (95 % CI)	B (95 % CI)	Multiadj. B (95 % CI)	B (95 % CI)	Multiadj. B (95 % CI)	B (95 % CI)	Multiadj. B (95 % CI)
Physical well-being	−3.15 (−9.35 to 3.05)	−0.86 (−7.19 to 5.46)	−3.84 (−9.73 to 2.06)	−2.34 (−8.30 to 3.62)	**−8.43 (−15.25 to −1.60)**	**−7.58 (−14.44 to −0.72)**	**−6.50 (−12.23 to −0.77)**	−5.43 (−11.32 to 0.46)
Emotional well-being	**−7.90 (−14.07 to −1.72)**	−6.21 (−12.53 to 0.12)	−1.34 (−7.29 to 4.61)	0.88 (−5.08 to 6.84)	**−8.07 (−14.94 to −1.20)**	**−6.89 (−13.75 to −0.03)**	**−6.91 (−12.66 to −1.15)**	−5.36 (−11.25 to 0.52)
Self-esteem	−1.72 (−8.57 to 5.14)	0.23 (−6.81 to 7.26)	−1.84 (−8.36 to 4.69)	−0.53 (−7.16 to 6.10)	−7.44 (−15.00 to 0.13)	−6.86 (−14.50 to 0.77)	−6.03 (−12.37 to 0.31)	−5.51 (−12.05 to 1.04)
Friends	−2.91 (−8.80 to 2.98)	−1.34 (−7.37 to 4.69)	−3.54 (−9.14 to 2.06)	−2.53 (−8.21 to 3.15)	**−8.81 (−15.28 to −2.34)**	**−8.26 (−14.80 to −1.72)**	−3.04 (−8.52 to 2.44)	−1.80 (−7.41 to 3.81)
School	−5.55 (−12.82 to 1.72)	−4.03 (−11.44 to 3.39)	−4.91 (−11.62 to 1.81)	−3.73 (−10.47 to 3.01)	**−11.36 (−19.17 to −3.54)**	**−10.92 (−18.87 to −2.97)**	0.50 (−5.97 to 6.97)	2.74 (−3.74 to 9.21)

Note: B unstandardized regression coefficient, adjusted for sex and age, *Multiadj.* adjusted for sex, age, and all categories of childhood adversities
Statistically significant associations are marked by bold numbers

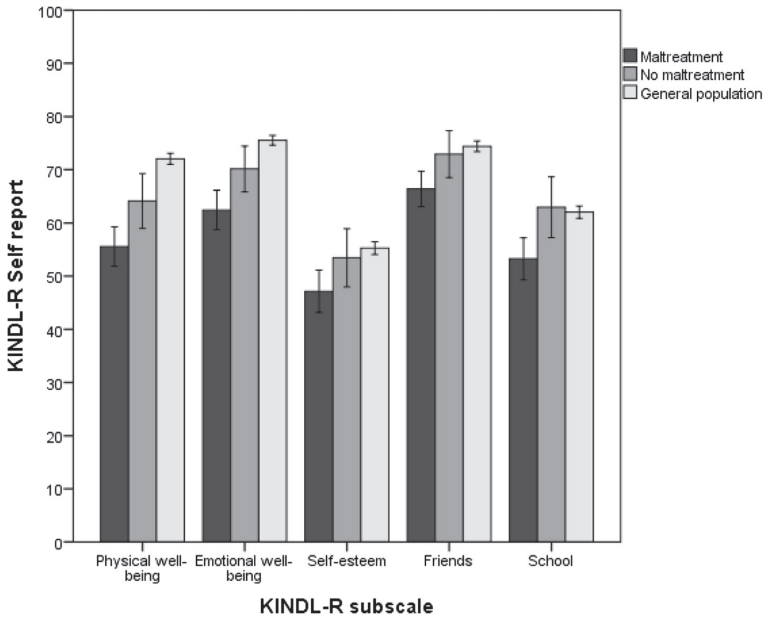

Fig. 2 Self-reported quality of life. Estimated mean scores on KINDL-R subdomains (0–100) compared between adolescents in RYC with reported childhood maltreatment, nonmaltreated adolescents in RYC, and adolescents from the general population. Error bars illustrate the 95 % confidence intervals of the mean scores. The subscale scores were compared by using ANCOVA, adjusted for age and sex. Pairwise comparisons were carried out by combining the global F-test with the local least significance difference test to preserve the familywise error rate (FWER). Mean scores, confidence intervals and p-values are presented in table 4 (Appendix 1)

dose–response effect in that increasing numbers of types of childhood adversities were associated with poorer QoL on self-reports. As shown in Table 1, there are some differences between our study population and the reference groups. The adolescents in RYC have a higher mean age than the general population sample, and there are more girls in the maltreated group of adolescents. However, this has been taken into account by adjusting for sex and age in the analyses.

QoL among adolescents in RYC with maltreatment histories compared with nonmaltreated peers in RYC and the general population

Adolescents with maltreatment histories reported lower scores than the reference groups on all five subdomains. The "School" subdomain did not show a significant trend on the global F-test across the three groups compared, but there was a difference in scores between the two groups of adolescents in RYC, as illustrated in Fig. 2. Previous experience of maltreatment seems to affect all five life domains in this population, which might be a key insight for understanding these adolescents' problems with subjective well-being in several life domains.

Physical well-being

Physical well-being is a subjective sensation of how the body works and functions. Feelings of illness, pain, low energy, or fatigue are factors that will influence the individual's physical well-being. We found that adolescents who had experienced maltreatment had a poorer score on the Physical Well-being subdomain than adolescents in our reference groups. This corresponds well with the study of Afifi et al., who reported that child abuse is an important determinant of both physical and mental health-related QoL in adulthood [36], and also with the findings of Lanier et al., who reported that children receiving child welfare services after reports of child abuse had poorer QoL scores on five subdomains (physical health, psychosocial health, emotional functioning, social functioning, and school functioning) compared with a normative sample [37]. Jud et al. did not find significant differences regarding physical well-being in maltreated versus nonmaltreated school-aged children on self-reports [38]. However, their study and control

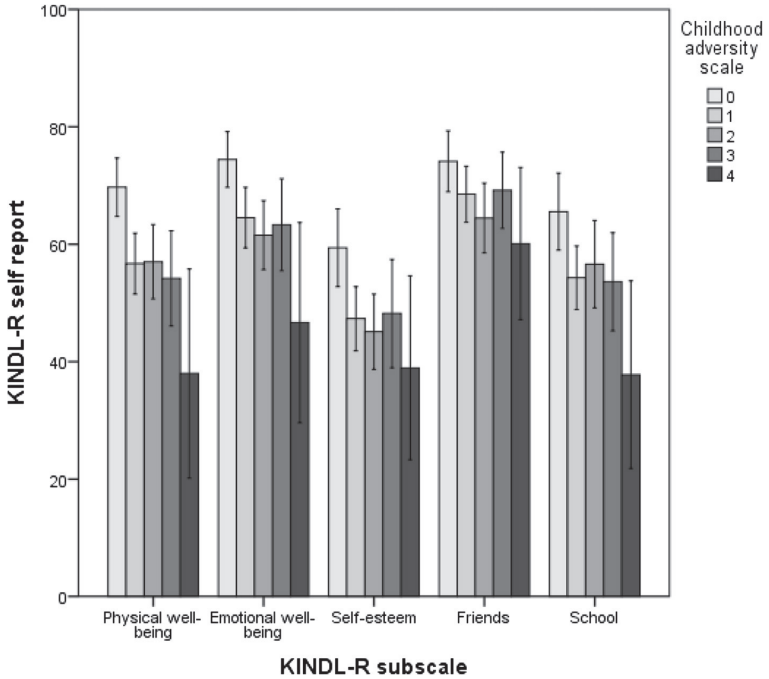

Fig. 3 Self-reported quality of life according to the number of types of childhood adversities. The childhood adversity scale is a 4-point scale consisting of the following items: household dysfunction (parental psychopathology, criminality, or alcohol or substance abuse), witnessing violence, victim of family violence, and victim of sexual abuse. Estimated mean scores on KINDL-R subdomains (0–100) were compared between adolescents in RYC with different adversity loads by using linear regression with the childhood adversity scale as the independent variable. The analysis was adjusted for age and sex. Mean scores, confidence intervals and p-values are presented in table 5 (Appendix 2)

populations were hospital samples, matched for chronic health conditions. A growing amount of research in recent decades has shown that childhood maltreatment is a major risk factor for a broad specter of physical health problems later in life, such as ischemic heart disease, chronic obstructive pulmonary disease, liver disease, obesity, and autoimmune disease [4, 40, 46, 47]. These are major causes of death in adults, and are expensive both for the individual and for society. Adolescents in RYC who experienced childhood maltreatment report poorer physical well-being than peers without these experiences. It may be questioned whether these adolescents receive the medical attention they require, and whether the decline in physical well-being might be preventable. To improve an individual's physical well-being, several factors could be considered in addition to increased medical care. Aerobic exercise and general physical activity are known to have positive effects on endurance, symptom relief, and well-being [48], and could be easily implemented in RYC units. Ensuring a well-balanced, nutritious diet could also contribute to improved physical well-being [49].

Emotional well-being

Emotional well-being is a subjective feeling of the degree of happiness, loneliness, boredom, anxiety, and insecurity. The adolescents who reported exposure to maltreatment reported poorer emotional well-being than their peers in the reference groups. These adolescents also had a significantly higher risk of psychiatric diagnoses [24], and our findings are therefore not surprising. The results confirm previous findings, but extend our understanding because the QoL subscale goes beyond pure psychopathology. Easy access to psychiatric health services for diagnostic assessment and therapy is of major importance for these adolescents, but in addition to this, less comprehensive interventions could also prove helpful within the RYC setting. To improve emotional well-being, physical activity is important [50], but meditative motion therapy, like yoga, tai chi, and qi gong have also

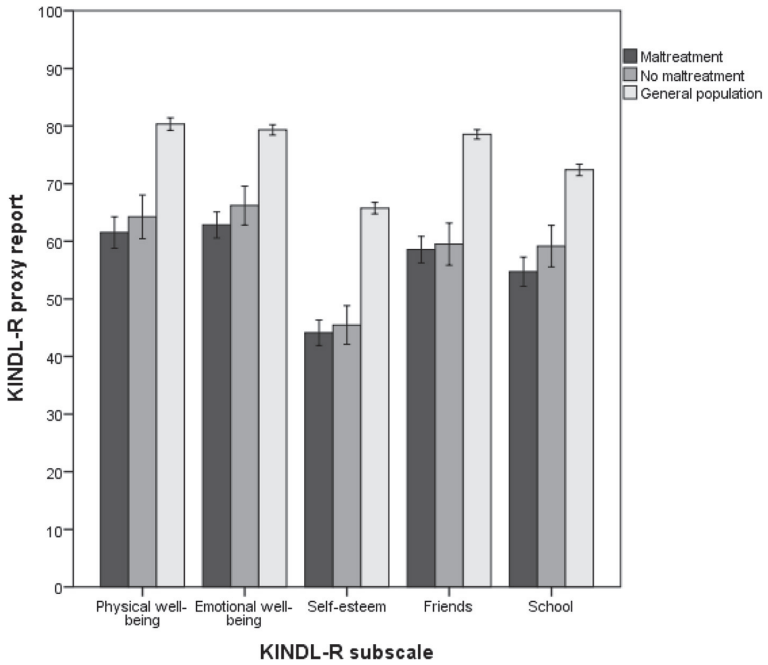

Fig. 4 Proxy-reported quality of life. Estimated mean scores on KINDL-R subdomains (0–100) compared between adolescents in RYC with childhood maltreatment histories, nonmaltreated adolescents in RYC, and adolescents from the general population. The reports were completed by adolescents' primary contacts at the institution (for adolescents in RYC) or parents (for the general population). Error bars illustrate the 95 % confidence intervals of the mean scores. The subscale scores were compared by using ANCOVA, adjusted for age and sex. Pairwise comparisons were carried out by combining the global F-test with the local least significance difference test to preserve the familywise error rate (FWER). Mean scores, confidence intervals and p-values are presented in table 4 (Appendix 1)

shown promising results in some smaller studies [48]. The practice of mindfulness could contribute to improving emotional well-being [51], as could ensuring a healthy diet [49, 52].

Self-esteem

The exposed group of adolescents reported a poorer level of self-esteem than adolescents from the general population. As shown in Fig. 2, they also reported poorer self-esteem than their nonexposed peers in RYC, but this difference was not statistically significant. Childhood maltreatment reflects the caregiver's inability to provide the safe and secure environment necessary for healthy development. For many children, this might communicate that they lack value and worth, thereby building a basis for low self-esteem. This could have long-lasting effects. Herrenkohl et al. reported poorer self-esteem among adults for whom child welfare services had reported maltreatment during childhood [53]. Improving self-esteem in adolescents in RYC could therefore make a huge impact. Therapeutic interventions addressing attachment difficulties could be considered, but programs that focus on increasing physical activity and exercise might also contribute to positive development [54, 55].

Friends

Adolescents in RYC evaluated their relationships with their friends to be poor, compared with the evaluations of adolescents in the general population [26]. In this study, we found that the exposed group of adolescents in RYC rated the quality of their friendships as even poorer than their nonexposed peers in RYC. Establishing relationships with friends is an important developmental task during adolescence. However, the experience of childhood maltreatment might result in negative expectations of all interpersonal relations, impeding the formation of new friendships with peers. In addition, adolescents in RYC have a high mean number of placements outside the family home. This contributes to a large number of broken relationships, making it especially

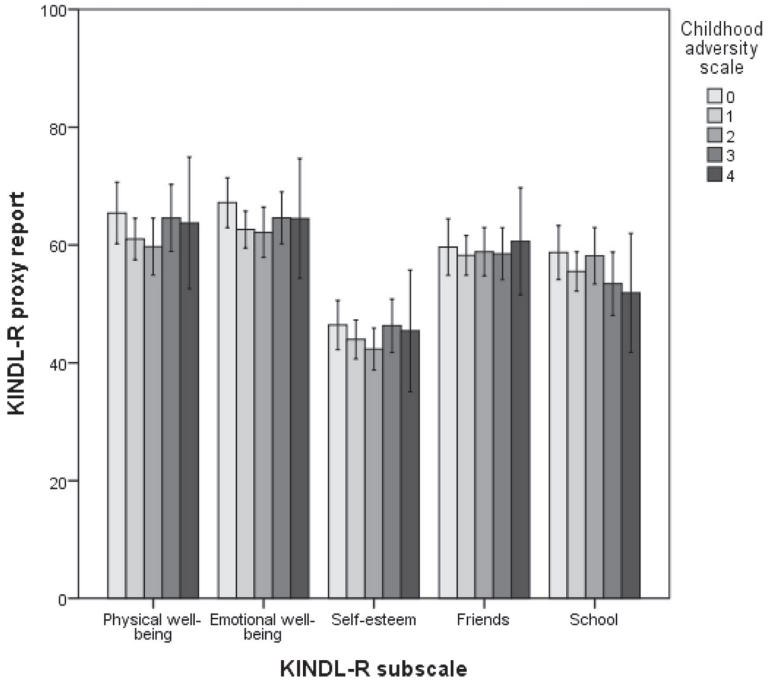

Fig. 5 Proxy-reported quality of life according to the number of types of childhood adversities. The childhood adversity scale is a 4-point scale consisting of the following items: household dysfunction (parental psychopathology, criminality, or alcohol or substance abuse), witnessing violence, victim of family violence, and victim of sexual abuse. Estimated mean scores on KINDL-R subdomains (0–100) were compared between adolescents in RYC with different adversity loads by using linear regression with the childhood adversity scale as the independent variable. The analysis was adjusted for age and sex. Reports were completed by adolescents' primary contacts at the institution (for adolescents in RYC) or parents (for the general population). Mean scores, confidence intervals and p-values are presented in table 5 (Appendix 2)

difficult to maintain long-lasting friendships in this population. Minimizing the number of placements of children and adolescents in child welfare is therefore an important goal, and cannot be emphasized enough. Each new placement makes it more difficult to establish long-term relationships and to keep friends over time.

School

The School subdomain measures how much the individual likes school and finds it interesting, how much the individual worries about grades or the future, and how well the individual feels he or she manages schoolwork. We did not find any overall significant differences between our three comparison groups on this subdomain. However, Fig. 2 illustrates that the exposed group of adolescents report a poorer relationship with school than their nonexposed peers in RYC. This is consistent with the review of Romano et al., where children and adolescents with maltreatment histories were found to exhibit impairments in academic achievement, such as poor performance in a variety of school subjects and according to standardized achievement measures, lower grade point averages, frequent school absences, and higher involvement in special education interventions [9]. Childhood maltreatment can cause disruptions in brain development that cause difficulties with memory, attention, and executive functions, all basic processes necessary for optimizing the ability to learn [56, 57]. Early intervention is essential, because poor school performance can result in long-lasting effects through low expectations of future achievement and success, not only by the individual but also by caregivers and teachers, thereby laying the foundations for future underachievement or failure.

Number of types of childhood adversities and QoL

Figure 3 illustrates the impact of the number of types of childhood adversities. On all five subdomains, there is a

significant negative trend showing that increasing numbers of types of childhood adversities corresponds with a lower self-reported QoL score. This corresponds well with the results of the study by Jernbro et al. [32], who found a linear relationship between the number of types of maltreatment and QoL. Our findings also correspond well with the results of Chan [33], who reported that adolescents who experienced four or more types of victimization had poorer QoL than adolescents exposed to fewer types of victimization.

Proxy report reliability

The primary contacts of the adolescents in RYC reported significantly lower scores for the adolescents than did the parents of adolescents in the general population on all five subdomains of the KINDL-R, implying that the RYC staff noticed a drop in QoL among adolescents in RYC generally. However, there was no difference between proxy reports of adolescents with and without maltreatment histories in RYC. Furthermore, the proxy reports did not show any significant difference according to the number of types of childhood adversities. This suggests that primary contacts do not notice the negative impact of maltreatment histories and number of types of adversities on different QoL subdomains, which is clear from the self-reports. In a previous study on the same population, significant differences were reported between self- and proxy reports on only the Physical Well-being and Friends subdomains, suggesting that primary contacts could serve as satisfactory substitutes for QoL information when self-reports are unavailable [26]. By contrast, the results of the present study suggest that primary contacts may *not* be reliable reporters of adolescents' QoL, at least not for adolescents with maltreatment histories.

Strengths and limitations

This was a large, nationwide study of a high-risk population with a good response rate of 67 %, which made it possible to study associations that would otherwise have been hidden. Because we had CBCL scores for both participants and nonparticipants, we could, in an earlier study of this sample [22], estimate DSM IV diagnoses for 541 adolescents, thereby confirming the representativeness of the 335 youths who actually completed the psychiatric interview. Further, we could compare participants with and without a completed KINDL-R, regarding internalizing and externalizing problems. The results showed no significant difference in externalizing problem scores between participants and nonparticipants; however, those who had completed the KINDL-R had a slightly lower internalizing problem score than those who had not (mean difference 2.35, 95 % CI 0.16–4.55). We also found a significant small-to-moderate negative correlation between internalizing problems and all five KINDL-R subdomains (Table 2). Our results might therefore be slightly underestimated compared with the total sample of adolescents in residential care participating in the study ($n = 400$), because the adolescents' actual QoL score would be slightly lower than we have reported. We did not have access to information on neglect or emotional or verbal abuse. However, previous research has shown that the prevalence of experienced neglect is increased in populations with other maltreatment histories. Further, in Norway, the official child protection policy is that foster care is the preferred form of placement and RYC is a last resort [58]. Thus, we presume that almost all adolescents in our investigated high-risk population would have experienced at least one form of neglect. This could also contribute to a slight underestimation of our results. Maltreatment histories were based on the adolescents' self-reports alone, and it is possible they could be biased. We did not use parents as informants, thereby limiting our knowledge of maltreatment histories and also the subdomain "Family." The cross-sectional design of the study limits our ability to draw conclusions on causality.

Conclusion

Adolescents in RYC with histories of childhood maltreatment report a poorer QoL than nonexposed peers in RYC and adolescents in the general population on all five QoL subdomains we studied. Exposure to more than one type of childhood adversity is common in this population, and is an additional factor negatively associated with QoL in a dose–response relationship. Maltreatment affects children and adolescents in several life domains, including their mental and physical health, and the short- and long-lasting consequences can be detrimental. The use of QoL measures among this high-risk population could unveil problems in areas that go beyond symptoms and diagnoses, thereby opening up the possibility of offering interventions and preventing a further decline in functioning at an early stage in development. Some interventions could be easily implemented by RYC staff, such as offering increased physical activity or exercise, and improving residents' diet, while others demand comprehensive cooperation between health services, child welfare services, and schools. We suggest that measures of QoL and maltreatment be included in the evaluation of the health and daily functioning of all adolescents in RYC.

Appendix 1

Table 4 QoI score in exposed and non-exposed adolescents (Figs. 2 and 4)

				Pairwise comparison *p*-value		
	Mean	95 % CI	F-test *p*-value	Maltr	No maltr	Gen pop
Self-reports:						
Physical well-being			<.001			
Maltr	57.96	(54.53, 61.38)		-	.006	<.001
No maltr	64.59	(60.31, 68.87)			-	.003
Gen pop	71.58	(70.34, 72.82)				-
Emotional well-being			<.001			
Maltr	63.71	(60.52, 66.90)		-	.003	<.001
No maltr	70.33	(66.35, 74.32)			-	.025
Gen pop	75.30	(74.15, 76.45)				-
Self-esteem			.002			
Maltr	47.34	(43.48, 51.21)		-	.090	<.001
No maltr	52.00	(47.17, 56.83)			-	.210
Gen pop	55.36	(53.96, 56.75)				-
Friends			<.001			
Maltr	65.58	(62.30, 68.86)		-	.006	<.001
No maltr	71.95	(67.85, 76.05)			-	.240
Gen pop	74.62	(73.43, 75.80)				-
School			.067			
Maltr	59.12	(55.03, 63.20)		-	.021	.358
No maltr	66.26	(61.00, 71.51)			-	.071
Gen pop	61.20	(60.00, 62.40)				-
Proxy-reports:						
Physical well-being			<.001			
Maltr	64.30	(61.29, 67.32)		-	.461	<.001
No maltr	65.91	(62.02, 69.79)			-	<.001
Gen pop	79.46	(78.15, 80.78)				-
Emotional well-being			<.001			
Maltr	62.96	(60.41, 65.51)		-	.072	<.001
No maltr	66.27	(62.99, 69.56)			-	<.001
Gen pop	79.28	(78.17, 80.39)				-
Self-esteem			<.001			
Maltr	43.78	(41.09, 46.46)		-	.393	<.001
No maltr	45.43	(41.97, 48.89)			-	<.001
Gen pop	65.83	(64.66, 67.00)				-
Friends			<.001			
Maltr	56.83	(54.39, 59.27)		-	.422	<.001
No maltr	58.24	(55.09, 61.38)			-	<.001
Gen pop	79.09	(78.03, 80.16)				-
School			<.001			
Maltr	57.21	(54.26, 60.15)		-	.066	<.001
No maltr	61.22	(57.44, 65.00)			-	<.001
Gen pop	71.82	(70.78, 72.86)				-

Appendix 2

Table 5 QoL by childhood adversity score (Figs. 3 and 5)

	Childhood adversity score	Mean	95 % CI	*p*-value
Self-report				
Physical well-being				.004
	0	69.70	(64.75, 74.66)	
	1	56.69	(51.49, 61.89)	
	2	57.01	(50.67, 63.34)	
	3	54.17	(46.05, 62.28)	
	4	37.98	(20.17, 55.79)	
Emotional well-being				.002
	0	74.43	(69.66, 79.20)	
	1	64.52	(59.37, 69.68)	
	2	61.54	(55.67, 67.40)	
	3	63.30	(55.47, 71.14)	
	4	46.63	(29.56, 63.71)	
Self-esteem				.046
	0	59.39	(52.76, 66.02)	
	1	47.32	(41.85, 52.79)	
	2	45.09	(38.68, 51.51)	
	3	48.19	(38.96, 57.41)	
	4	38.94	(23.28, 54.60)	
Friends				.015
	0	74.12	(68.91, 79.32)	
	1	68.51	(63.75, 73.27)	
	2	64.46	(58.52, 70.39)	
	3	69.17	(62.69, 75.66)	
	4	60.10	(47.15, 73.05)	
School				.027
	0	65.54	(59.01, 72.08)	
	1	54.29	(59.37, 69.68)	
	2	56.60	(49.12, 64.08)	
	3	53.61	(45.22, 61.99)	
	4	37.78	(21.80, 53.76)	
Proxy-report				
Physical well-being				.257
	0	65.42	(60.21, 70.63)	
	1	61.02	(57.47, 64.56)	
	2	59.72	(54.86, 64.57)	
	3	64.59	(58.90, 70.28)	
	4	63.74	(52.55, 74.93)	
Emotional well-being				.980
	0	67.17	(62.96, 71.39)	
	1	64.52	(59.48, 65.78)	
	2	62.14	(57.87, 66.41)	
	3	46.28	(60.22, 69.00)	
	4	64.50	(54.32, 74.68)	
Self-esteem				.898
	0	46.42	(42.24, 50.59)	
	1	43.95	(40.66, 47.24)	
	2	42.32	(38.77, 45.87)	
	3	46.28	(41.75, 50.81)	
	4	45.42	(35.08, 55.76)	
Friends				.325
	0	59.66	(54.85, 64.46)	
	1	58.22	(54.83, 61.61)	
	2	58.86	(54.75, 62.97)	
	3	58.52	(54.11, 62.93)	
	4	60.61	(51.51, 69.71)	
School				.418
	0	58.73	(54.14, 63.31)	
	1	55.50	(52.14, 58.85)	
	2	58.17	(53.36, 62.98)	
	3	53.41	(48.00, 58.81)	
	4	51.88	(41.76, 61.99)	

Competing interests
The authors declare that they have no competing interests.

Authors' contributions
HKG conceived of the study and its design, carried out the statistical analyses, and drafted the manuscript. AKM participated in the study design and helped draft the manuscript. SL planned and supervised the statistical analyses, and helped draft the manuscript. TJ conceived of the study and its design, supervised the statistical analyses, and helped draft the manuscript. All authors have read and approved the final manuscript.

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Author details
[1]Department of Child and Adolescent Psychiatry, St. Olavs Hospital, Pb 6810 Elgeseter, 7433 Trondheim, Norway. [2]Department of Public Health and General Practice, Norwegian University of Science and Technology (NTNU), Faculty of Medicine, Pb 8905 MTFS, 7491 Trondheim, Norway. [3]Children's Clinic, St.Olavs Hospital, Pb 3250 Sluppen, 7006 Trondheim, Norway. [4]Norwegian University of Science and Technology (NTNU), Faculty of Medicine, RKBU Central Norway, Pb 8905 MTFS, 7491 Trondheim, Norway.

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Paper III

Childhood Maltreatment, Psychopathology and Well-being: The Mediator Role of Global Self-esteem, Attachment Difficulties and Substance Use

Hanne K. Greger [a, b], Arne K. Myhre [c,d], Christian A. Klöckner [e], Thomas Jozefiak [a, b]

[a] Department of Child and Adolescent Psychiatry, St. Olavs Hospital, Pb 6810 Elgeseter, 7433 Trondheim, Norway

[b] Norwegian University of Science and Technology (NTNU), Faculty of Medicine, RKBU Central Norway, Pb 8905 MTFS, 7491 Trondheim, Norway

[c] Norwegian University of Science and Technology (NTNU), Faculty of Medicine, Department of Public Health and General Practice, Pb 8905 MTFS, 7491 Trondheim, Norway

[d] Children's Clinic, St.Olavs Hospital, Pb 3250 Sluppen, 7006 Trondheim, Norway

[e] Department of Psychology, Norwegian University of Science and technology, Trondheim, Norway

Corresponding author: Hanne Klæboe Greger
Address: Department of Child and Adolescent Psychiatry, St. Olavs Hospital, Pb 6810 Elgeseter, 7433 Trondheim, Norway
Phone: +47-97762464
e-mail: hanne.k.greger@ntnu.no

Abstract

Childhood maltreatment is known to be associated with a broad variety of psychopathology and deteriorated well-being in adolescent populations. In the present nationwide study, we aimed to explore global self-esteem, attachment difficulties and substance use as possible mediators of these associations in a high-risk adolescent population. We included 400 adolescents (aged 12-20 years) living in residential youth care in Norway (response rate 67 %). The participants completed a semi-structured psychiatric interview (Child and Adolescent Psychiatric Assessment (CAPA)), a study-specific questionnaire, a revised version of the Self-Perception Profile for Adolescents (SPPA) and the Questionnaire for Measuring Health-related Quality of Life in Children and Adolescents (KINDL-R). Information was also provided by the adolescent's primary contact at the institution. Two models were tested using structural equation modelling; one assessed the association between childhood maltreatment and psychopathology, and one assessed the association between childhood maltreatment and well-being. Childhood maltreatment, psychopathology, well-being, global self-esteem and attachment difficulties were treated as latent variables, and substance use was added as an observed variable. The results of this study showed that global self-esteem was a mediator of paths in both models, whereas attachment difficulties and substance use were not. Preventing decline in health and well-being in high-risk adolescents is a main goal, and this study suggests that improving self-esteem, in addition to providing psychiatric health services, could be an important tool for achieving this goal.

Key words

Childhood maltreatment, adolescents, psychopathology, quality of life, self-esteem

Introduction

Childhood maltreatment represents tremendous global health problems and have long-lasting negative effects on both mental health and well-being/quality of life (QoL) as has been shown in numerous studies the last decades (Al-Fayez, Ohaeri, & Gado, 2012; Buckingham & Daniolos, 2013; Edwards, Holden, Felitti, & Anda, 2003; Lanier, Kohl, Raghavan, & Auslander, 2015; Scott, Smith, & Ellis, 2010). In this paper, we define childhood maltreatment as witnessing violence, physical abuse by a family member, sexual abuse, parental criminal behaviour, parental alcohol or drug abuse, and parental psychiatric problems. Psychopathology represents various mental health problems and symptoms of psychiatric disorders. Adolescent perceived well-being is a dynamic process related to the quality of the individual's present life, and can be indicated by a variety of indicators, such as physical, emotional and social factors (Ben-Arieh & Frønes, 2011; Wallander & Koot, 2016). However, while the significance of the associations between these concepts now seems to be indisputable, there is less knowledge about which factors that might mediate the associations. A mediating model seeks to explain underlying mechanisms of observed relationships between two variables through inclusion of a third hypothetical variable (mediator). Knowledge about important mediating factors of the path between childhood maltreatment, psychopathology and well-being could provide opportunities to prevent further mental health problems and the deterioration of well-being in the individual. Adolescents in residential youth care (RYC) show high prevalence of experienced childhood maltreatment, psychiatric disorders and of poor QoL (defined according to Mattejat and Remschmidt (Mattejat & Remschmidt, 1998) as *the individual's subjectively perceived well-being and satisfaction with*

life according to his/her own experience in different life domains) (Greger, Myhre, Lydersen, & Jozefiak, 2015, 2016). Further, child abuse negatively affects self-perceptions, self-esteem and self-related behavior (Susan Harter, 1998). Depending on their developmental stage, children who are repeatedly assaulted could easily come to the conclusion that they have low value and self-worth. In contrast to general population samples or patient samples from child mental health services, all adolescents in RYC have been removed from their primary caregivers. Furthermore, they have experienced many out-of-home placements by child welfare services (Kayed et al., 2015). Combined with experienced childhood maltreatment their relationships to significant others have been affected, and they display increased attachment problems (Jozefiak et al., 2016; Lehmann, Havik, Havik, & Heiervang, 2013) compared with other populations. Finally, smoking, extensive alcohol and drug use are associated with experienced childhood maltreatment (Anda et al., 1999; Cheng & Lo, 2010; Dube et al., 2003; Dube et al., 2006; Shin, Hong, & Hazen, 2010; Wright, Fagan, & Pinchevsky, 2013). Identifying additional factors to target in treatment of these vulnerable youths could be extremely valuable. Therefore, in the present study, we are focusing on self-esteem, attachment difficulties and substance use as possible mediators of the association between childhood maltreatment and psychopathology, and between childhood maltreatment and well-being.

Self-esteem is a subjective evaluation of what an individual thinks of himself/herself, often denoted as global self-esteem. Several studies have found an association between maltreatment and low self-esteem (Shen, 2009; Silvern et al., 1995; Winstok, 2015) and between low self-esteem and various mental health problems (Capaldi & Stoolmiller, 1999; Derdikman-Eiron et al., 2011; Orth, Robins, Trzesniewski, Maes, & Schmitt, 2009; Ranoyen,

Stenseng, Klockner, Wallander, & Jozefiak, 2015; Sowislo & Orth, 2013; Steiger, Allemand, Robins, & Fend, 2014). Studies have also reported associations between low self-esteem and poor QoL or well-being in general adolescent populations (Karatzias, Chouliara, Power, & Swanson, 2006) and adolescent and adult populations with psychiatric problems (Bastiaansen, Koot, & Ferdinand, 2005; Kunikata, Mino, & Nakajima, 2005; Oliveira, Carvalho, & Esteves, 2016). Some studies are also suggesting a mediating effect of self-esteem between childhood maltreatment and mental health problems (Arslan, 2016; Soler, Kirchner, Paretilla, & Forns, 2013; Suzuki & Tomoda, 2015; Turner, Shattuck, Finkelhor, & Hamby, 2015). However, we have not found any studies that suggest a mediating effect of self-esteem between childhood maltreatment and well-being.

Healthy attachment is based on the intimate and emotional ties between a child and the caregiver, and is supported by environmental stability, parental sensitivity and responsiveness to the child's needs. Children and adolescents in foster care or RYC have often not been provided with these fundamental factors. Exposure to maltreatment could further disturb development of healthy attachment, especially when conducted by a caregiver, and is a major risk factor of reactive attachment disorder (RAD). In a previous study based on the same population, it was found that adolescents in RYC who had experienced maltreatment had a significantly increased risk of several co-morbid diagnosis pairs. Among these were RAD/conduct disorder (CD) and RAD/generalized anxiety disorder (GAD) (Greger et al., 2015). In a study of high-risk adolescents residing in out-of-home foster and group residential care in England, Kay and Green found that multiple maltreatment was associated with attention seeking and that RAD subscales were highly associated with psychopathology (Kay & Green, 2013). It is therefore possible that the presence of attachment difficulties could also

mediate the association between childhood maltreatment and psychopathology or well-being also in adolescents.

Adolescence is a developmental period characterized by multiple transitions, which predispose individuals to risk-taking behavior (Leather, 2009), such as engaging in experiments with tobacco, alcohol and substance use. Exposure to multiple forms of childhood adversity has been shown to be associated with early initiation of smoking (Anda et al., 1999) and with the use of alcohol and illicit drugs in adolescence (Cheng & Lo, 2010; Shin et al., 2010; Wright et al., 2013) and adulthood (Dube et al., 2003; Dube et al., 2006). Several studies have demonstrated an association between alcohol or substance use and mental health problems among adolescents (Copeland, Rooke, & Swift, 2013; Mangerud, Bjerkeset, Holmen, Lydersen, & Indredavik, 2014; Skogen et al., 2014). The results from a recent study from the US, suggest that substance use partially mediates the association between sexual abuse and symptoms of depression and post-traumatic stress disorder in young women (Ulibarri, Ulloa, & Salazar, 2015). Therefore we find it possible that extensive use of tobacco, alcohol and drugs, represented by the total number of different substances the individual has tried out, could mediate the association between childhood maltreatment and psychopathology or well-being in adolescents.

In two previous studies on the same study population of adolescents in RYC, an association between experienced childhood maltreatment (witnessing violence, victim of family violence, victim of sexual abuse, household dysfunction) and both a broad spectrum of psychiatric disorders and a poor QoL was found (Greger et al., 2015, 2016). In this study we want to

explore underlying mechanisms by studying global self-esteem, attachment difficulties and substance use as possible mediating factors of the associations between childhood maltreatment and psychopathology, and between childhood maltreatment and well-being.

Methods

Participants

The data for this study were obtained from the Norwegian research project: ”*Mental health in children and adolescents in child welfare institutions”*. All residential care units providing care for adolescents aged 12–23 years in Norway were invited to participate in the study. Unaccompanied minors without asylum in Norway and adolescents on acute placement were excluded from the study because they were considered to be in such a high state of crisis that data collection should not be prioritized. Insufficient Norwegian language ability was another exclusion criterion. A total of 86 of the 98 invited institutions agreed to participate in the study, and 400 of the 601 eligible adolescents participated, giving a response rate of 67%. Of those included in the study, 335 youths completed the psychiatric interview, yielding information about child maltreatment histories. Child Behavior Check List (CBCL) scores were available for the participants, as well as for 141 anonymous non-participants. These data made it possible to estimate complete diagnoses according to the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) for 541 adolescents using Bayesian multiple imputation (MI) estimation. Estimated prevalence rates of psychiatric diagnoses showed only a small deviance from the observed prevalence rates, which were based on completed psychiatric interviews, thereby confirming the representativeness of the 335 youths

who completed the psychiatric interview. For further details, see Greger et al. (Greger et al., 2015) and Jozefiak et al.(Jozefiak et al., 2015).

Procedures

Data collection was conducted by research assistants who visited the institutions and completed semi-structured psychiatric interviews with adolescents and their primary contacts, and collected questionnaires from adolescents, primary contacts and the leaders of the institutions. Four trained interviewers were used; they had been educated in relevant fields (master's degrees in psychology/social work, one bachelor's degree in mental health, and a nurse who specialized in mental health) and had extensive prior experience working with children and families. During the whole period of data collection, a team of child and adolescent psychiatrists and psychologists was on call in case of emergencies. Data were collected from June 2011 until July 2014.

Measures

Psychopathology. The Child and Adolescent Psychiatric Interview (CAPA) is a semi-structured psychiatric interview designed to gather information from children and adolescents (Angold & Costello, 2000). The protocol contains both required questions and optional follow-up questions. The CAPA uses a computer-based algorithm for diagnostic evaluation, which results in DSM-IV diagnoses. In a previous study on the same data, we found high prevalence of both internalizing and externalizing psychiatric diagnoses among maltreated adolescents (Greger et al., 2015). Prevalent diagnoses in these two categories were generalized anxiety disorder (GAD) (27.8%), major depressive disorder (MDD) (29.1%) and

conduct disorder (CD) (20.7%). To assess psychopathology in the present study, we used the CAPA dimensional symptom scores that these three prevalent CAPA diagnoses are based on in this population; GAD, MDD and CD.

Childhood maltreatment. To assess the load of childhood maltreatment of each adolescent, we constructed a latent variable based on the following information about child maltreatment history from the CAPA, and the additional interview of the adolescents:
(1) *Witness of violence,* where the person saw or heard but was not the object of an event with potential for life threatening or severe physical injury, including seeing someone shot or killed, hearing someone raped or beaten in an adjacent room, or seeing someone killed or severely injured in an accident.

(2) *Victim of family violence*, where the person was the victim of physical abuse by a member of the family.

(3) *Victim of sexual abuse,* where a sexual abuse episode(s) occurred in which a person ("the perpetrator") involved the child or adolescent in activities for the purpose of the perpetrator's own sexual gratification. Activities included kissing (that made the person uncomfortable), genital fondling (over or under clothing), oral–genital or oral–anal contact, genital or anal intercourse, or use of instruments. Sexual abuse does not include medical exams or mutually desired sexual relations with a peer.

(4) *Household dysfunction,* where the adolescent reported that at least one of the biological parents had a history of psychiatric problems, often got drunk or used drugs, or the adolescent had been removed from the family home because of parental crime, alcohol or drug abuse, or psychiatric problems.

Presence (value 1) and non-presence (value 0) of these categories were used as indicators for the latent variable Childhood maltreatment.

Well-being. In the present study, we were interested in Well-being as a concept composed by physical, emotional and social well-being. The Kinder Lebensqualität Fragebogen (Questionnaire for Measuring Health-related Quality of Life in Children and Adolescents, revised version, KINDL-R) is a well-established QoL instrument for children aged 8–16 years and has been used in several clinical and epidemiological studies. The questionnaire consists of 24 items and six subscales: Physical Well-being, Emotional Well-being, Self-esteem, Family, Friends, and School. Each item addresses the child's experience over the past week, and is rated on a 5-point scale (1 = never, 5 = always). We treated Well-being as a latent variable by using sum-scores of three of the KINDL-R subscales as indicators: Physical Well-being, Emotional Well-being and Friends. Negative worded items were reversed, and the single scores were then added up to yield sum-scores of the subscales.

Global self-esteem. The revised version of the Self-Perception Profile for Adolescents (SPPA) was administered to the adolescents participating in the study. The original questionnaire contains 45 items resulting in eight specific subdomains of self-esteem and one five-item measure of global self-worth (S Harter, 2012). In the present study, we use the term "global self-esteem" to represent the SPPA scale "global self-worth". The revised version of the questionnaire is available in Norwegian and was culturally adapted with a simplified response format, where each statement was followed by four response options (1=describes me poorly; 4=describes me very well). The revised scale showed better convergent and factorial validity than the original scale in a study of Norwegian adolescents from the general population (Wichstrom, 1995). The SPPA is based on a theory of self-esteem as a multidimensional concept. The eight specific subdomains each represent different arenas on which the

individual adolescent will have a specific evaluation of his/her own competence. Global self-esteem, on the other hand, constitutes a general perception of the self, and of how much the individual likes himself/herself as a person (S Harter, 2012). Thus, the SPPA constitutes two different categories of self-evaluations. In the present study, we chose to focus on global self-esteem, using five items. We used these as single indicators for the latent concept Global self-esteem, with high scores of the latent variable meaning high global self-esteem.

Attachment difficulties. The adolescents themselves were not considered to be reliable reporters of attachment difficulties. This information was therefore collected from their primary contact at the institution. RAD is not incorporated as a part of the CAPA. Thus, this information was collected using selected items from the preschool age version (PAPA) of the CAPA. For more details, see Jozefiak et al. (Jozefiak et al., 2016). A latent variable was constructed using 11 out of 15 available symptom items the RAD diagnosis is based on. Three items were considered to be not well suited for an adolescent population and therefore were omitted. These were “seeking comfort from strangers”, “negative reunion response” and “frozen watchfulness”. One item (“lack of interest in people”) was omitted because of a high number of missing values (75.5 %). Originally the items were scored from 0 to 1, 2 or 3. To construct a comparable scale, all item scores were regrouped to fit in a two-point scale, ranging from 0 (no problem) to 2 (problems in most activities or with most persons), with a high score indicating more attachment difficulties.

Substance use. As part of the CAPA interview, the adolescents were asked 18 specific questions about whether they had ever tried certain stimulants and substances, including

alcohol and tobacco, but also illicit drugs like heroin, cocaine and cannabis. This resulted in a variable ranging from 0 to 18, which was used as an observed variable in the structural equation model (SEM) analysis.

Statistics

Using SEM, we tested two path models in order to examine whether the associations between (1) Childhood maltreatment and Psychopathology, and (2) Childhood maltreatment and Well-being could be mediated by Global self-esteem, Attachment difficulties or Substance use. Statistical analyses were conducted using SPSS Statistics (v. 22; IBM SPSS, Armonk, NY) and Mplus (v. 7.31) (Muthén & Muthén, 1998-2012). To assess the goodness-of-fit of the two models, we used the following indices: the chi-squared test, the comparative fit index (CFI), the Tucker-Lewis index (TLI) and the root mean square error of approximation (RMSEA). A non-significant chi-squared test, CFI- and TLI-values >0.95 and RMSEA-values < 0.06 were considered to be indicators of a good model fit (Yu, 2002). Because of the categorical nature of the SPPA and Childhood maltreatment variables, the models were estimated with weighted least square parameter estimates using the WLSMV method. We wanted to study the mediating effects on Psychopathology and Well-being separately. Thus, two parallel hypothesized models were created (Fig.1). In both models we included the latent variables Childhood maltreatment, Attachment difficulties and Self-Esteem. In both models, we allowed the residuals of certain items of Attachment difficulties that were quite similar to correlate pairwise with each other. These items were «Indiscriminate willingness to join strangers» and «Indiscriminate friendliness towards peers», «Indiscriminate friendliness towards peers» and «Indiscriminate friendliness towards adults», and «Avoiding physical contact» and «Difficulties with devotion». Substance use was the only observed variable in

these models, and was therefore correlated with all latent variables in the measurement models to obtain a goodness of fit measure also including Substance use. In the first step of the structural analyses, Psychopathology and Well-being were regressed on Childhood maltreatment in two separate analyses to calculate the direct effects. In the next step of the analyses, the three potential mediators were included at once in each model and regressed on Childhood maltreatment. Psychopathology (Fig.2) and Well-being (Fig. 3), were also regressed on the potential mediators. The path models were adjusted for sex and age in the analyses. Bootstrapping with 1000 draws was used to obtain reliable standard errors for calculating the indirect effects, and 95% confidence intervals (CI) were reported. Alpha levels of two-sided p-values <.05 were considered statistically significant. Correlation coefficients categorized as 0–0.29 = small, 0.3–0.59 = moderate, and 0.6–1 = high.

The frequency of missing values in the dataset varied across the different variables. Total case missing for the individual variables were 0.3% (Childhood maltreatment, item missing 0.2% - 16.2%), 25.0% (Well-being, item missing 25.2% - 29.0%), 19.3% (Global self-esteem, item missing 19.5% - 22.0%), 4.8% (Attachment difficulties, item missing 4.7% - 9.8%), and 16.2% (Substance use). To investigate consequences of missing data and attrition, we had conducted an attrition analysis in an earlier study of the same data set (Jozefiak et al., 2016). We had available data from CBCLs (Achenbach & Rescorla, 2001) completed by primary contacts of both participants and 141 anonymous non-participating youth. Using age, sex and CBCL data as predictors for all missing values on psychiatric diagnoses in 541 adolescents in Bayesian MI, we compared the observed prevalence of psychiatric disorders with the estimated prevalence. The results showed only minor differences between observed and estimated prevalence figures, and the conclusion was that the sample was representative for

non-participating adolescents in RYC with regard to mental health. A detailed description of the procedure is given elsewhere (Jozefiak et al., 2016). Therefore, missing values in the present study were handled by using the full information maximum likelihood (FIML) procedure in Mplus generating full datasets of N=400.

Ethics

The Norwegian Regional Committee for Medical and Health Research Ethics approved the present study and the main research project, Mental Health in Children and Adolescents in Child Welfare Institutions (number of reference 2013/1128/REC Central). Written informed consent was obtained, and if the participant was under 16 years of age, consent from the guardian was also obtained. To avoid making participants feel pressured to participate, the head of the institution received detailed verbal and written information about the research project. A standardized information/invitation letter that had previously been approved by the Committee for Medical and Health Research Ethics was distributed to the adolescents. This information letter described in detail, using simple language, the kind of information to be assessed. It was emphasized that participation in the project was voluntary, that the adolescent did not need to complete all the questions and that the participant could retract consent at any time. When the research assistants arrived at the institutions, the same information was given once again verbally to ensure that the adolescent gave informed, voluntary consent to participate in the study. The earlier conducted attrition analysis using anonymous CBCL data of non-participants, as described above, was also approved by the Committee for Medical and Health Research Ethics.

Results

Descriptive data

The participating adolescents in this sample had a mean age of 16.8 years (SD 1.37, range 12-20 years). Gender distribution showed a slight dominance of girls of 57.5%.

Measurement models

Table 1 shows the standardized factor loadings for both models. All beta values were statistically significant ($p<0.05$), indicating that the items all contribute significantly to the listed latent variables.

The Psychopathology model. As expected due to a relatively large sample size, the chi-square statistic was significant (χ^2 (240) = 536.316, $p<0.0001$). However, other goodness-of-fit measures for the psychopathology model indicated an acceptable model fit (RMSEA = 0.056, CFI = 0.935, TLI = 0.925). Correlation among the latent and observed variables of the model are shown in Table 2, and vary from low to moderate, except for Childhood maltreatment and Psychopathology which show a high correlation.

The Well-being model. The chi-square statistic was also significant for the Well-being model, (χ^2 (240) = 475.239, $p<0.0001$). Other goodness-of-fit measures indicated an acceptable model fit (RMSEA = 0.050, CFI = 0.940, TLI = 0.931). Correlation among the latent and

observed variables of the model are shown in table 3, and vary from low to moderate, except for Global self-esteem and Well-being which show a high correlation.

Path models

Mediators of the association between childhood maltreatment and psychopathology. Figure 2 shows the unstandardized regression weights for the paths of the model. Statistically significant paths and effects are highlighted in bold lines and numbers. Without potentially mediating variables in the model, the regression coefficient of the direct effect between Psychopathology and Childhood maltreatment is statistically significant ($p<.05$). In the full model, the direct effect is non-significant, indicating that the association is fully mediated by the variables included in the model. A high level of Childhood maltreatment was significantly associated with a low level of Global self-esteem ($b = - 0.462$, $p < .01$) and a low level of Global self-esteem was significantly associated with a high level of Psychopathology ($b = - 0.444$, $p< .01$). The indirect effect of this path turned out to be borderline significant ($b = 0.205$, $p <0.1$, 95% confidence interval of the regression coefficient -0.007 - 0.390). The paths through Attachment difficulties and Substance use were not statistically significant and cannot be interpreted as mediators in this model.

Mediators of the association between childhood maltreatment and well-being. Figure 3 shows the unstandardized regression weights for the paths of the model of association between Childhood maltreatment and Well-being. Statistically significant paths and effects are highlighted in bold lines and numbers. Without potentially mediating variables in the model, the regression coefficient of the direct effect between Well-being and Childhood maltreatment

is statistically significant ($p<.05$). In the full model, the direct effect is non-significant, indicating that the association is fully mediated by the variables included in the model. Global self-esteem was the only variable in the model with a statistically significant path. A high level of Childhood maltreatment was associated with a low level of Global self-esteem ($b = -0.468$, $p<.01$), and a low level of Global self-esteem was associated with low level of Well-being ($b = 2.304$, $p<.01$). The indirect effect was also statistically significant with a negative loading ($b = -1.078$, $p<.01$), indicating that when mediated by Global self-esteem, a high level of Childhood maltreatment was associated with a low level of Well-being. The paths through Attachment difficulties and Substance use were not statistically significant and cannot be interpreted as mediators in this model.

Discussion

The results of this study indicate that global self-esteem might be an important mediator of the association between childhood maltreatment and psychopathology even in a population of high-risk adolescents in RYC. This supports the results of previous studies in other populations (Arslan, 2016; Soler et al., 2013; Suzuki & Tomoda, 2015; Turner et al., 2015). However, these studies are conducted on different populations within different cultural and social settings, and use a variety of measures of adversities, mental health outcomes and self-esteem. A recent study of high-school youths from Turkey showed that self-esteem and resilience partially mediated relationships between psychological maltreatment and emotional and behavioral problems (Arslan, 2016). Suzuki and Tomoda studied institutionalized children and adolescents in Japan, and found that childhood adversity predicted depression, but only via attachment styles and self-esteem (Suzuki & Tomoda, 2015). In a study of high-school youths in Spain, Soler et al. found that different facets of self-esteem (self-liking and

self-competence) had different impacts on the relationship between victimization and internalizing and externalizing symptoms, with self-liking being the most relevant (Soler et al., 2013). Self-liking was defined as a self-evaluation of worth as a social being, comparable to the concept global self-esteem used in the present study. Self-liking was found partially to mediate associations between victimization and both internalizing (girls and boys) and externalizing (girls only) symptoms. Turner et al. found that self-esteem and mastery (a sense of having one's life chances under one's own control) had mediating associations between poly-victimization and psychological distress symptoms in a large sample (n = 1186) of US youths ages 10-17 with stable high or increasing levels of victimization (Turner et al., 2015). Even though only limited research results are available, global self-esteem and comparable measures are found to have relevant mediating effects on associations between single/multiple maltreatment and a variety of psychiatric symptoms and problems in different studies. This underlines the relevance and importance of the results of the present study, and suggests that clinical interventions including enhancement of global self-esteem might be effective in treating psychiatric symptoms and preventing long-term mental health consequences of childhood maltreatment in different adolescent populations.

Furthermore, the current study expands our knowledge by showing that self-esteem also acts as a mediator of the association between childhood maltreatment and well-being. To our knowledge, this has not been shown in any previous study. The well-being measure in the present study included three subdomains: physical, emotional and social well-being. Global self-esteem is a concept that embraces how the individual evaluates himself/herself as a person. Our findings indicate that global self-esteem has a broad impact on several of the life domains of the adolescent. The ability to have a robust idea of self-worth and value constantly

develops from mid-childhood as a social construction and depends on the cognitive function of the child (S. Harter, 2015). Childhood maltreatment can influence the individual's view of himself/herself, but because global self-esteem is constantly prone to change, it is also possible to modulate it in a positive way, given the right tools. Thus, enhancing self-esteem in a high-risk adolescent population could possibly prevent an expected decline in mental health and well-being as result of exposure to childhood maltreatment. This could be an important alternative target for intervention in addition to psychiatric health services and trauma therapy whenever indicated. Barendregt et al. showed that the use of active coping strategies was associated with increase in self-esteem in their longitudinal study of adolescents with severe psychiatric problems in secure residential care (Barendregt, Van der Laan, Bongers, & Van Nieuwenhuizen, 2015). Enhancing active coping strategies could therefore be one way of achieving higher self-esteem. Thus, our findings call for further research on, and development of, new global self-esteem-enhancing interventions for a high-risk group of adolescents living in RYC.

We did not find any statistically significant associations between childhood maltreatment and attachment difficulties, and thereby no mediating effect of this latent variable. However, the associations between attachment difficulties and both psychopathology and well-being were statistically significant. The presence of high levels of attachment difficulties, represented by the 11 selected items of RAD in this study, was associated with high levels of psychopathology. It is possible that investigating attachment styles (Suzuki & Tomoda, 2015) instead of the more restrictive RAD symptoms would have led to different results.

We did find a strong and statistically significant association between childhood maltreatment and substance use. High levels of childhood maltreatment were associated with having tried out a high number of different substances and stimulants. This is in accordance with previous research that has found relationships between a variety of adversities and smoking, alcohol and drug use (Anda et al., 1999; Cheng & Lo, 2010; Dube et al., 2003; Dube et al., 2006; Shin et al., 2010; Wright et al., 2013). However, we did not find a significant association between substance use and psychopathology or well-being, and thereby no mediating effects. The variable used to indicate substance use in this study did not measure frequency of use. It is possible that frequency of use is an even more important factor than the number of different substances tried.

Strength and limitations

This is a nationwide study of a selected group of high-risk adolescents. Data was collected through both semi-structured psychiatric interviews and questionnaires. It is possible that some of the adolescents were reluctant to report about childhood maltreatment in this interview setting. Thus, the assessment of childhood maltreatment could have been supplemented by a more specific maltreatment interview, such as the MACE (Maltreatment and Abuse Chronology of Exposure) Scale (Teicher & Parigger, 2015) or JVQ-R2 (Juvenile Victimization Questionnaire – 2nd revision) (Hamby, Finkelhor, Turner, & Kracke, 2011). However, these instruments were not available in Norwegian during the data collection. Furthermore, the information about childhood maltreatment came solely from the adolescents. Third-party information could possibly have increased the validity of information. We did not have available information about exposure to neglect. However, the priorities of the child welfare system in Norway are such that children and adolescents in need of out-of-home care

will always be considered for foster-home placements first. Thus, RYC will be a last resort (Backe-Hansen, Bakketeigen, Gautun, & Grønningsæter, 2011), and we can assume that almost all of the adolescents have been exposed to some sort of neglect. Additionally, when registering childhood maltreatment, *frequency* of exposure where not taken into account. This could possibly have increased the associations found in the study. Diagnosing RAD in adolescents is controversial; however, even though one of the diagnostic criteria of RAD is presence of symptoms before the age of 5, subscales of RAD were shown to be highly associated with functional impairment in a group of English high-risk adolescents (Kay & Green, 2013). Even if the proposed models tested in this study support regression arrows in one specific direction, the cross-sectional design of this study limits conclusions of causality. However, the present study showed that global self-esteem has an important mediator role in the associations between childhood maltreatment and psychopathology/well-being.

Conclusion

The aim of this study was to explore global self-esteem, attachment difficulties and substance use as possible mediators of the associations between childhood maltreatment and psychopathology, and childhood maltreatment and well-being in a high-risk population of adolescents in RYC. The results of the analyses showed that global self-esteem acted as a mediator of both paths, while the other two factors did not. Self-esteem is a powerful concept in constant development from mid-childhood to adulthood. It is subject to influence from both positive and negative experiences, and should therefore be considered as a possible target for interventions. Childhood maltreatment is very prevalent in a population of adolescents in RYC, and these adolescents are at especially increased risk of negative mental health and QoL development. Preventing this decline in health is a main goal, and this study suggests that

improving self-esteem could be an important tool in addition to psychiatric health services and trauma therapy whenever this is indicated.

Competing interests

The authors declare that they have no competing interests.

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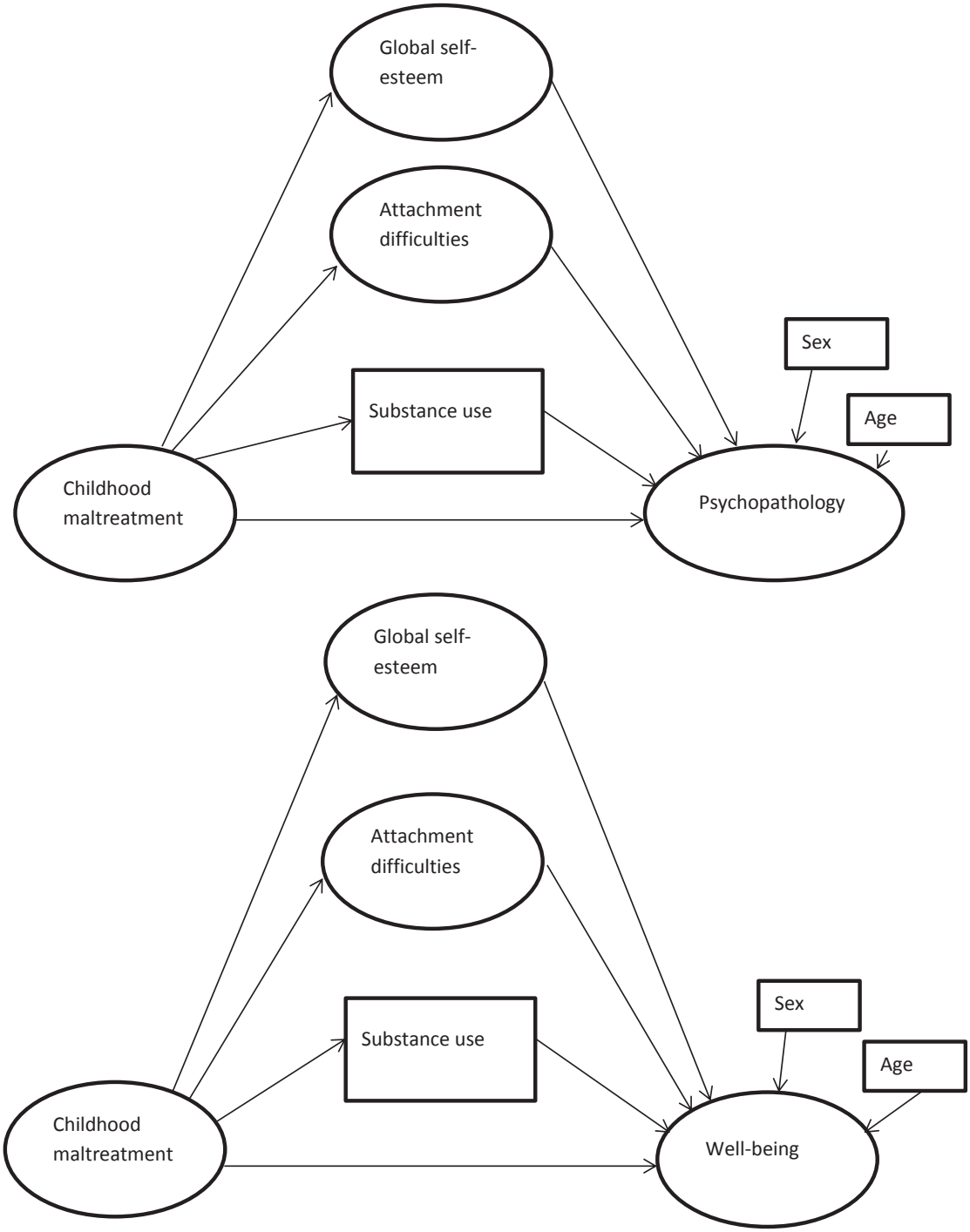

Fig. 1 Hypothesized models

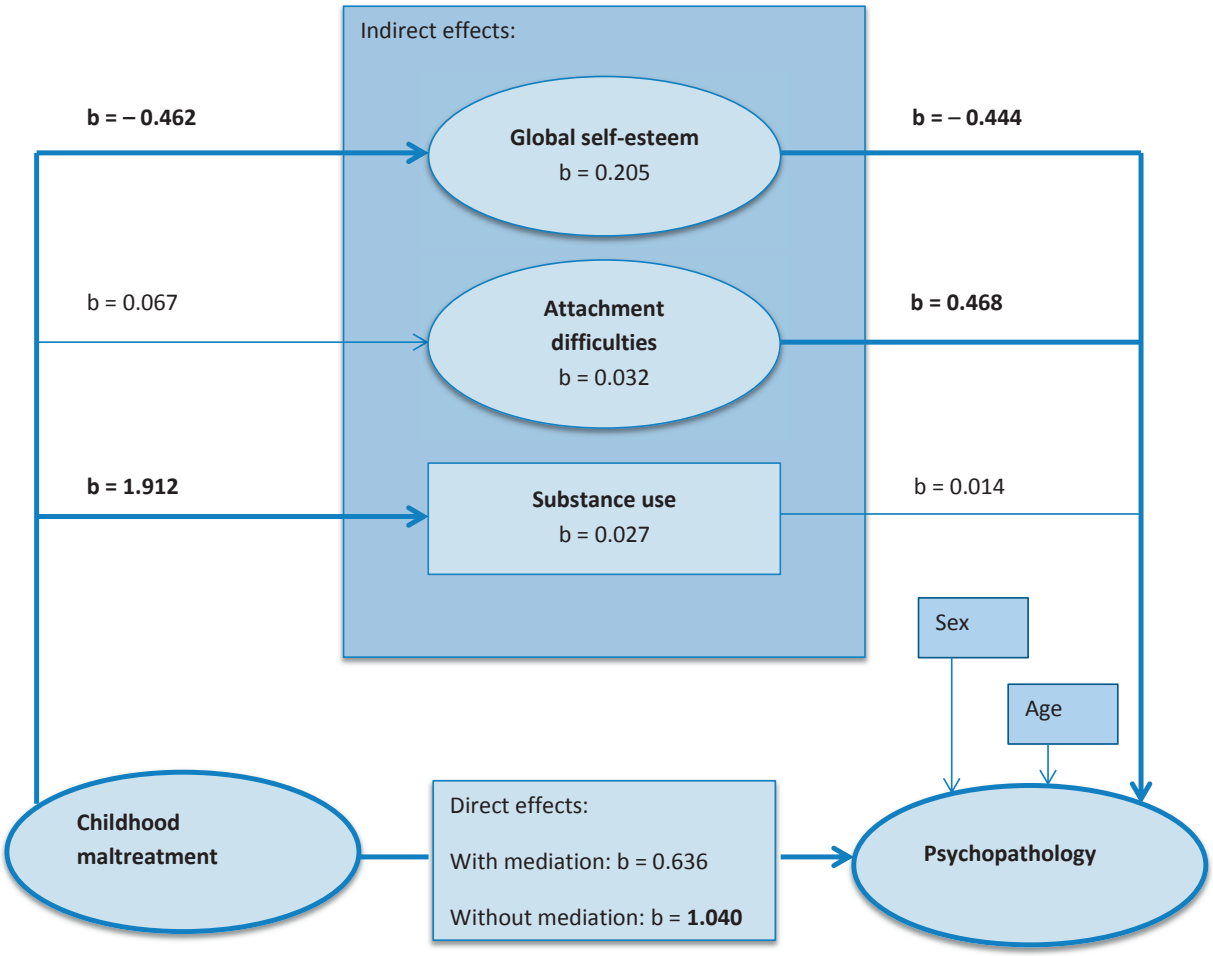

Fig. 2

Path-model of the association between childhood maltreatment and psychopathology. Unstandardized regression weights of paths and indirect effects are shown. Bold lines and numbers are used to highlight statistically significant effects.

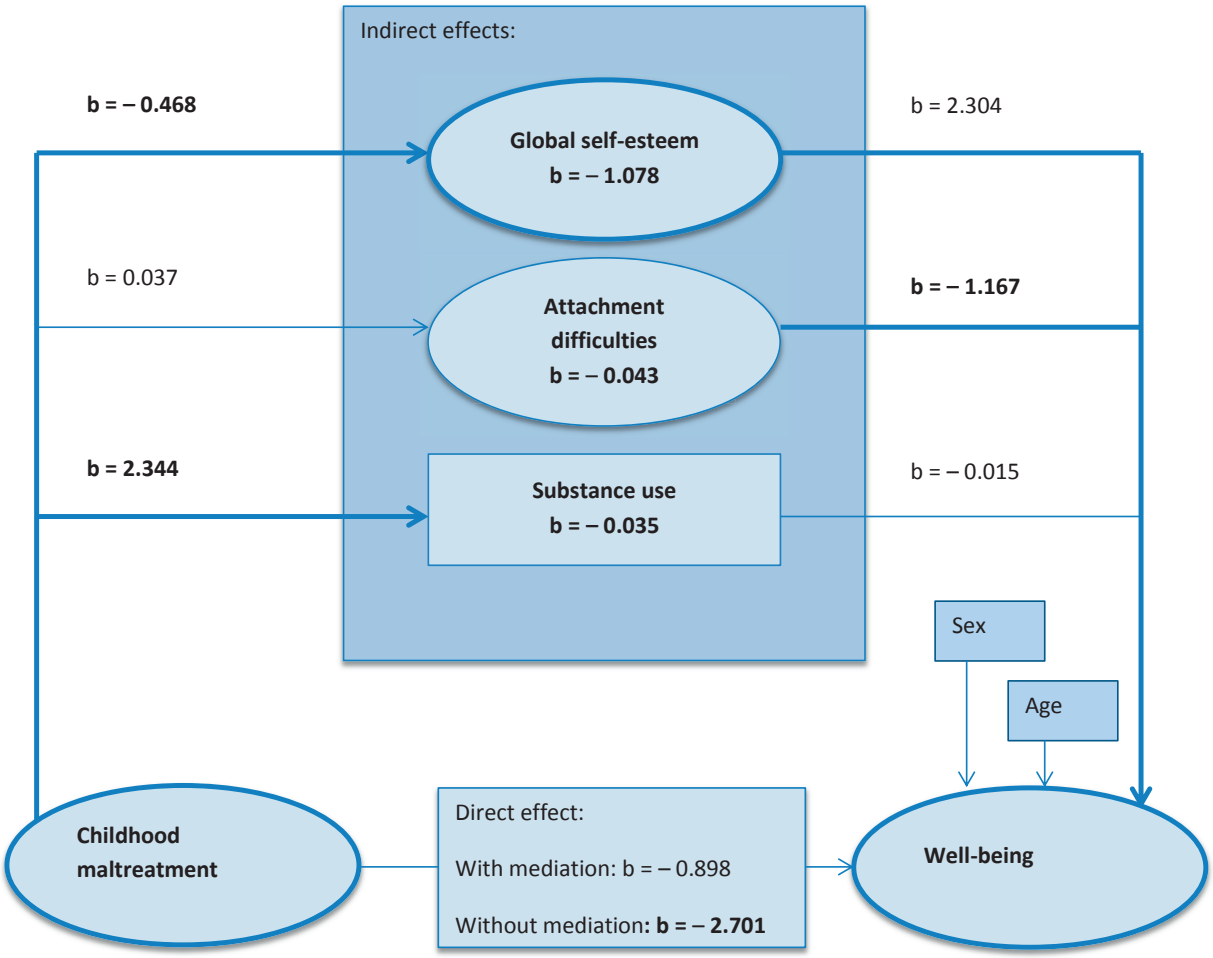

Fig. 3

Path-model of the association between childhood maltreatment and well-being. Unstandardized regression weights of paths and indirect effects are shown. Bold lines and numbers are used to highlight statistically significant effects.

Table 1 Descriptive statistics for scales and factor loadings for latent variables

	Range	Mean	SD	β_1	β_2
Childhood maltreatment					
Sexual abuse	0–1			0.689	0.719
Victim of family violence	0–1			0.433	0.404
Witness of violence	0–1			0.204	0.249
Household dysfunction	0–1			0.478	0.464
Global self-esteem					
Often disappointed in myself (reversed)	1–4	2.62	1.01	0.733	0.727
Do not like the way I live my life (reversed)	1–4	2.70	1.11	0.645	0.630
Mostly happy with myself	1–4	2.92	0.99	0.839	0.840
Like myself the way I am	1–4	2.92	1.01	0.919	0.924
Very happy with how I am	1–4	2.77	1.01	0.898	0.898
Attachment difficulties					
Social problems	0–2	0.36	0.77	0.390	0.338
Difficulties with devotion	0–2	0.53	0.88	0.294	0.263
Lack of empathy	0–2	0.43	0.82	0.545	0.513
Avoids eye contact	0–2	0.21	0.61	0.530	0.484
Unpredictable reunion responses	0–2	0.42	0.63	0.619	0.629
Indiscriminate friendliness towards adults	0–2	0.36	0.62	0.536	0.570
Indiscriminate friendliness towards peers	0–2	0.38	0.67	0.352	0.384
Indiscriminate to join adult strangers	0–2	0.37	0.67	0.477	0.477
Minimal checking in unfamiliar settings	0–2	0.14	0.44	0.362	0.372
Hypervigilance	0–2	0.11	0.37	0.541	0.548
Avoids physical contact	0–2	0.24	0.49	0.246	0.272
Psychopathology					
Number of symptoms of general anxiety	1–6	2.08	1.97	0.822	
Number of symptoms of conduct disorder	1–15	1.33	1.51	0.185	
Number of symptoms of major depressive disorder	1–9	2.81	2.33	0.885	
Well-being					
KINDL-R Physical well-being	4–20	13.29	4.00		0.731
KINDL-R Emotional well-being	4–20	14.24	3.84		0.759
KINDL-R Friends	4–20	14.89	3.67		0.538
Substance use	0–18	3.63	3.29		

Note. β_1: Standardized factor loadings in the measurement model for psychopathology. β_2: Standardized factor loadings in the measurement model for well-being.

Table 2 Correlation among the latent and observed variables of the Psychopathology model

	Childhood maltreatment	Psycho-pathology	Global self-esteem	Attachment difficulties	Substance use
Childhood maltreatment	–				
Psychopathology	0.609	–			
Global self-esteem	–0.369	–0.550	–		
Attachment difficulties	0.077	0.322	–0.028	–	
Substance use	0.343	0.255	–0.126	0.026	–

Table 3 Correlation among the latent and observed variables of the Well-being model

	Childhood maltreatment	Well-being	Global self-esteem	Attachment difficulties	Substance use
Childhood maltreatment	–				
Well-being	–0.338	–			
Global self-esteem	–0.339	0.663	–		
Attachment difficulties	0.041	–0.214	–0.014	–	
Substance use	0.380	–0.162	–0.129	0.016	–

Appendix

APPENDIX 1

Additional adolescent questionnaire

PSYKISK HELSE HOS BARN OG UNGE I BARNEVERNINSTITUSJONER

TILLEGGSINTERVJU AV UNGDOM

ID-nummer ⇨ [| |] [|] Institusjon Individ

Intervjuers initialer ⇨ [| |] STORE bokstaver!

LeS DETTE FØR DU STARTER!	Skjemaet skal leses maskinelt. Vennligst fyll ut skjemaet slik: • *Bruk svart/blå kulepenn. Skriv tydelig, og ikke utenfor feltene.* ***Kryss av slik:*** ☒ • *Feilkryssinger kan annulleres ved å fylle hele feltet med farge. Kryss så i rett felt.* • *Sett bare ett kryss på hvert spørsmål om ikke annet er oppgitt.*

A. OMSORGSHISTORIKK

1. Hvor mange år var du da du flyttet hjemmefra første gang (etter bestemmelse fra barnevernet)? ⇨ [|]

2. Hvor flyttet du da? ⇨
   - Til andre familiemedlemmer ... ☐1
   - Til fosterforeldre ... ☐2
   - Til barnehjem/institusjon ... ☐4
   - Annet ... ☐5

   Annet: ⇩ STORE BOKSTAVER, *ett tegn pr. felt.*

   [| | | | | | | | | | | | | | | | | | | | | | | | | |]

3. Hva var årsaken til flyttingen?

   NB: Ett eller flere kryss.
   1. Problemer mellom deg og foreldre/foresatte ... ☐
   2. Bortfall av forelder/foresatt ... ☐
   3. Rusproblemer hos deg ... ☐
   4. Atferdsproblemer hos deg ... ☐
   5. Kriminalitet hos deg ... ☐
   6. Foreldres problemer med rus ... ☐
   7. Foreldres problemer med alkohol ... ☐
   8. Foreldres problemer med psykisk sykdom ... ☐
   9. Foreldres problemer med kriminalitet ... ☐
   10. Vold mellom foreldre ... ☐
   11. Vold mellom foreldre og deg ... ☐

B. SUPPLERENDE OPPLYSNINGER OM HELSEHJELP/ANDRE TILTAK

1. Hadde du eller familien hjelp fra barnevernet da du bodde hjemme sist? ⇨ Ja ....☐1 Nei ..☐2 Vet ikke ...☐3

2. *Hvis ja:* Hva slags hjelp? ⇨
   NB: Ett eller flere kryss.
   1. Støttekontakt for deg .....☐
   2. Besøkshjem for deg.....☐
   3. Hjelp i hjemmet.....☐
   4. MST.....☐
   5. Annet .....☐

   Annet:⇩ STORE BOKSTAVER, *ett tegn pr. felt.*

3. Har moren din en kronisk sykdom? *(f.eks. MS/CP/kreft/diabetes etc.)* ⇨ Ja ....☐1 Nei ..☐2 Vet ikke ...☐3

4. *Hvis ja:* Vennligst spesifiser:⇩ STORE BOKSTAVER, *ett tegn pr. felt.*

5. Har moren din psykiske vansker? ⇨ Ja ....☐1 Nei ..☐4 Vet ikke ...☐4

6. *Hvis ja:* Vennligst spesifiser:⇩ STORE BOKSTAVER, *ett tegn pr. felt.*

7. Har moren din fått hjelp for psykiske vansker? ⇨ Ja ....☐1 Nei ..☐2 Vet ikke ...☐3

8. *Hvis ja:* Har noen fra hjelpeapparatet snakket med deg om disse vanskene? Ja ....☐1 Nei ..☐2

9. Har faren din en kronisk sykdom? *(f.eks. MS/CP/kreft/diabetes etc.)* ⇨ Ja ....☐1 Nei ..☐2 Vet ikke ...☐3

10. *Hvis ja:* Vennligst spesifiser:⇩ STORE BOKSTAVER, *ett tegn pr. felt.*

11. Har faren din psykiske vansker? ⇨ Ja ....☐1 Nei ..☐2 Vet ikke ...☐3

12. *Hvis ja:* Vennligst spesifiser:⇩ STORE BOKSTAVER, *ett tegn pr. felt.*

13. Har faren din fått hjelp for psykiske vansker? ⇨ Ja ....☐1 Nei ..☐2 Vet ikke ...☐3

14. *Hvis ja:* Har noen fra hjelpeapparatet snakket med deg om disse vanskene? Ja ....☐1 Nei ..☐2

15. Har du selv noen gang fått en diagnose? ⇨ Ja .... ☐1 Nei .. ☐2 Vet ikke ... ☐3

16. *Hvis ja:* Vennligst spesifiser: ⇩ STORE BOKSTAVER, *ett tegn pr. felt.*

C. FORELDRES BRUK AV MEDIKAMENTER/ALKOHOL/RUS

Nå kommer noen spørsmål om din *mor*:

1. Røyker din mor? ⇨ Ja .... ☐1 Nei .. ☐2 Vet ikke ... ☐3

2. *Hvis hun røyker:* Har hun røykt så lenge du kan huske? ⇨ Ja .... ☐2 Nei .. ☐3

3. Drikker din mor ofte så mye at hun blir full? ⇨ Ja .... ☐1 Nei .. ☐2 Vet ikke ... ☐3

4. *Hvis hun drikker seg full:* Har hun drukket seg full ofte så lenge du kan huske? ⇨ Ja .... ☐1 Nei .. ☐2

5. *Hvis hun drikker seg full:* Hvor mange ganger i måneden drikker hun seg full? ⇨ ☐☐
(*Bruk egne ord for hvor mange ganger i måneden.*)

6. Ruser moren din seg? ⇨ Ja .... ☐1 Nei .. ☐2 Vet ikke ... ☐3

7. *Hvis hun ruser seg:* Har hun ruset seg ofte så lenge du kan huske? ⇨ Ja .... ☐1 Nei .. ☐2

8. *Hvis hun ruser seg:* Bruker hun sprøyter? ⇨ Ja .... ☐1 Nei .. ☐2

9. *Hvis hun ruser seg:* Hvor mange ganger i måneden ruser hun seg? ⇨ ☐☐
(*Bruk egne ord for hvor mange ganger i måneden.*)

10. Har din mor ofte brukt mye medisiner? ⇨ Ja .... ☐1 Nei .. ☐2 Vet ikke ... ☐3

11. *Hvis hun har brukt mye medisiner:* Hva tok hun medisiner mot? ⇨
NB: Ett eller flere kryss.

1. Smerter ..... ☐	3. Depresjon .... ☐	6. Sovemedisiner .. ☐
2. Kvalme ..... ☐	4. Angst ..... ☐	7. Annet..... ☐
	5. Epilepsi ..... ☐	8. Vet ikke ..... ☐

Så har vi noen spørsmål om din *far*:

12. Drikker din far ofte så mye at han blir full? ⇨ Ja .... ☐1 Nei .. ☐2 Vet ikke ... ☐3

13. *Hvis han drikker seg full:* Har han drukket seg full ofte så lenge du kan huske? ⇨ Ja .... ☐1 Nei .. ☐2

14. *Hvis han drikker seg full:* Hvor mange ganger i måneden drikker han seg full? ⇨ (*Bruk egne ord for hvor mange ganger i måneden.*) ☐

15. Ruser faren din seg? ⇨ Ja .... ☐1 Nei .. ☐2 Vet ikke ... ☐3

16. *Hvis han ruser seg:* Har han ruset seg ofte så lenge du kan huske? ⇨ Ja .... ☐1 Nei .. ☐2

17. *Hvis han ruser seg:* Bruker han sprøyter? ⇨ Ja .... ☐1 Nei .. ☐2

18. *Hvis han ruser seg:* Hvor mange ganger i måneden ruser han seg? ⇨ (*Bruk egne ord for hvor mange ganger i måneden.*) ☐

D. SPØRSMÅL OM EGET RUSBRUK

1. Har du brukt rus på institusjonen? ⇨ Ja..... ☐1 ⇨ Nei ..... ☐2 2. *Hvis ja:* Hvor mange ganger? ⇨ ☐

3. *Hvis ja:* Hvilke typer rusmidler? ⇨

NB: Ett eller flere kryss.

1. Alkohol ..... ☐
2. Sniffing ..... ☐
3. Hasj/marihuana ..... ☐
4. Amfetamin ..... ☐
5. Heroin ..... ☐
6. Ecstasy ..... ☐
7. Annet ..... ☐

Annet: ⇩ STORE BOKSTAVER, *ett tegn pr. felt.*

4. Har du kjøpt rusmidler på institusjonen? ⇨ Ja..... ☐1 ⇨ Nei ..... ☐2 5. *Hvis ja:* Hvor mange ganger? ⇨ ☐

6. Har du kjøpt rusmidler av andre utenfor institusjonen? ⇨ Ja..... ☐1 ⇨ Nei ..... ☐2 7. *Hvis ja:* Hvor mange ganger? ⇨ ☐

8. Har du solgt rusmidler mens du har bodd på institusjonen? ⇨ Ja..... ☐1 ⇨ Nei ..... ☐2 9. *Hvis ja:* Hvor mange ganger? ⇨ ☐

E. SKOLEHISTORIKK

1. Går du på skole i dag? ⇨ Ja .... ☐1 Nei .. ☐2

2. *Hvis nei:* Er du... ⇨

NB: Ett eller flere kryss.

1. ... ferdig med ønsket/planlagt utdanning? ..... ☐
2. ... utplassert i praksis? ..... ☐
3. ... i arbeid? ..... ☐
4. ... arbeidsledig? ..... ☐
5. ... arbeidssøkende? ..... ☐
6. ... trygdet? ..... ☐
7. ... annet? ..... ☐

Annet: ⇩ STORE BOKSTAVER, *ett tegn pr. felt.*