

Forord

Denne hovedoppgaven er basert på data fra forskningsprosjektet Psykisk helse hos barn og unge i barneverninstitusjoner ved Regionalt kunnskapssenter for barn og unge (RKBU), Midt-Norge. Tema for hovedoppgaven ble valgt i samråd med prosjektleder Nanna Sønnichsen Kayed og veileder Trude Reinfjell. Undertegnede var ikke involvert i datainnsamlingen, men har hatt en selvstendig rolle i utforming av problemstilling og hypoteser, samt bearbeiding av variabler og utførelse av de statistiske analyser. Trude Reinfjell, Odin Hjemdal og Nanna Sønnichsen Kayed har veiledet.

Jeg vil takke Nanna Sønnichsen Kayed for tilgang til data, gode innspill, og ikke minst for tilliten. Tusen takk til Trude Reinfjell, som har vært min hovedveileder. Takk for ditt stillas, din deling av kunnskap, og for god hjelp i oppgavens ulike faser. Tusen takk til Odin Hjemdal for veiledning i valg av statistiske analyser og gjennomlesning av metode og resultater.

Takk til mine gode venner Ida Elisabeth Angeltveit og Vegard Flage Henriksen for korrekturgjennomgang.

Terje og Ida, takk for husrom og hjerterom. Takk til Lars som alltid er der for meg.

Christine Lind
Trondheim, 13.12.2015

Abstract

Background: Adolescents in residential youth care (RYC) are at risk for impaired mental and physical health, but the knowledge of chronic pain and Health-Related Quality of Life (HRQOL) in this population is scarce. The aim of this study was to investigate the prevalence of chronic pain, chronic pain across psychiatric disorders, and HRQOL, in adolescents in the Norwegian RYC.

Methods: This study was part of a large scale, nationwide study of the RYC in Norway, administered at Regionalt kunnskapssenter for barn og unge (RKBU) Midt-Norge. Residents between the ages of 12-20 living in RYC in Norway were the inclusion criteria. The total number of participants in the study came from 86 institutions, with 601 available adolescents. 201 adolescents/parents did not give their consent, so in total 400 adolescents aged 12-20 participated (67 %). The participants were assessed through a cross-sectional approach using the Kinder Lebensqualität Fragebogen (KINDL-R) to measure health-related quality of life. Further, the adolescents were interviewed using the Child and Adolescent Psychiatric interview (CAPA) in the assessment of psychiatric disorders (DSM-IV), and to measure chronic pain symptoms.

Results: The prevalence of chronic pain in the total sample was 42%. Among adolescents with a psychiatric disorder, 59.6% reported chronic pain. Adolescents with emotional- and anxiety disorders had the highest prevalence of chronic pain. Girls reported a significantly higher frequency of chronic pain. Age and placement status did not have any statistically significant influence on the frequency of chronic pain. Self-reports of HRQOL revealed that both chronic pain and psychiatric disorders are associated with significantly poorer HRQOL compared to those not having chronic pain or a psychiatric disorder. Having both a chronic pain condition and a psychiatric disorder was associated with significantly poorer HRQOL compared to having either chronic pain *or* a psychiatric disorder.

Conclusions: There is a relatively high prevalence of chronic pain in the RYC population, both in adolescents with and without a psychiatric disorder. Both chronic pain and psychiatric disorders have a significant negative impact on levels of HRQOL, and the findings indicate the importance of improving factors associated with impaired HRQOL in the RYC population.

Table of Contents

CHRONIC PAIN ACROSS PSYCHIATRIC DISORDERS, AND THEIR IMPACT ON HEALTH-RELATED QUALITY OF LIFE – A STUDY OF THE NORWEGIAN RESIDENTIAL YOUTH CARE POPULATION.....	7
PHYSICAL HEALTH AND CHRONIC PAIN	8
CHRONIC PAIN AND PSYCHIATRIC DISORDERS	12
HEALTH-RELATED QUALITY OF LIFE.....	14
AIM AND HYPOTHESIS.....	17
METHODS	19
PARTICIPANTS AND RECRUITMENT	19
PROCEDURES.....	20
INSTRUMENTS.....	20
ETHICS.....	22
STATISTICS	23
RESULTS.....	25
FREQUENCY OF CHRONIC PAIN	25
ASSOCIATIONS BETWEEN PSYCHIATRIC DISORDERS AND CHRONIC PAIN	25
EFFECT OF GENDER, AGE AND PLACEMENT STATUSES ON CHRONIC PAIN	28
HEALTH-RELATED QUALITY OF LIFE IN ADOLESCENTS WITH CHRONIC PAIN AND PSYCHIATRIC DISORDERS.....	28
DISCUSSION	31
PREVALENCE.....	31
SEX DIFFERENCES, AGE EFFECTS AND PLACEMENT STATUS	32
CHRONIC PAIN ACROSS PSYCHIATRIC DISORDERS	33
HEALTH-RELATED QUALITY OF LIFE.....	37
STRENGTHS AND LIMITATIONS	40
CONCLUSIONS.....	42
REFERENCES	43

Chronic pain across psychiatric disorders, and their impact on Health-Related Quality of Life – A study of the Norwegian residential youth care population

Children and adolescents in out-of-home care are for various reasons unable to live with their biological families, often due to concerns regarding their safety and welfare. It is a population characterized by higher prevalence of childhood maltreatment, such as physical or sexual abuse and neglect (Simms, Dubowitz, & Szilagy, 2000). They may also be more likely to have relationship losses, multiple moves, and a family history of psychiatric illness, which may have contributed to the removal from home (McMillen et al., 2005). The often seen troubled background of these children and adolescents makes this a high-risk population in terms of mental and physical health problems. The high prevalence of mental health dysfunction in children and adolescents in residential care, as well as other placement types, such as foster care, are well documented (Egelund & Lausten, 2009; Greger, Myhre, Lydersen, & Jozefiak, 2015; McMillen et al., 2005; Schmid, Goldbeck, Nuetzel, & Fegert, 2008). Approximately 8% of children and adolescents in Norway meet the criteria to one or more psychiatric disorders (Mykletun, Knudsen, & Mathiesen, 2009). A study by Jozefiak et al. (2015) found, in comparison, that 76.2% of adolescents in residential youth care (RYC) in Norway met the criteria for at least one DSM-IV diagnosis (Jozefiak et al., 2015). Other studies have found different prevalence rates. McMillen et al. (2005) found a prevalence of 32% for at least one lifetime psychiatric disorder in a foster care system sample (N = 373), 15% met the criteria for more than one disorder the past year. In contrast, Schmid et al. (2008) found a prevalence of 59.9% for meeting the criteria for at least one ICD-10 psychiatric diagnosis in a sample of adolescents in a RYC. Regarding the mental health problems, the RYC population seems to resemble more closely the clinical population in the Child and Adolescent Mental Health Services (CAMHS) than the general population. In fact, mental health problems are highly overrepresented in children and adolescents in foster- and

residential care (Egelund & Lausten, 2009). The most common psychiatric disorders in late adolescence are anxiety disorders, depression, behavior disorders and learning difficulties, self-harm, eating disorders and drug abuse. Autism spectrum disorders, psychosis and mania also occurs, but less frequently (Mykletun et al., 2009).

Physical health and chronic pain

There is a lack of systematic studies of the physical health status compared to the mental health status in children and adolescents in out-of-home care, which has led to a limitation in the literature (Nelson et al., 2011). The Adverse Childhood Experiences (ACE) study has shown an association between adverse childhood experiences and poor physical health in adulthood, which included ischemic heart disease, cancer, chronic lung disease and liver disease (Dube, Felitti, Dong, Giles, & Anda, 2003; Felitti et al., 1998). This demonstrates the vast effects such experiences can have on the adult health. The physical health of children and adolescents in out-of-home care are reported to be poorer compared to children and adolescents from the general population (Halfon, Mendonca, & Berkowitz, 1995; Jee et al., 2006; Leslie et al., 2005). The health issues adolescents have entering the child welfare system may reflect past traumatic experiences and neglect. In a study based on the same sample as the present study, exposure to maltreatment was reported by 71% of the adolescents, and girls reported more traumatic events compared to boys (Greger et al., 2015). Another study, which was also based on the same sample as the present study, indicate that adolescents in RYC experience their physical health as more impaired compared to both the general population and the population of adolescent outpatients in the CAMHS (Jozefiak & Sønnichsen Kayed, 2015). Even though studies indicate impaired physical health in the out-of-home care population, few studies have investigated the prevalence of chronic pain in the RYC population as well as in the general out-of-home-care population.

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

The International Association for the Study of Pain defines pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Merskey & Bogduk, 1994). Chronic pain can be seen as pain that persists past the normal time of healing (Bonica, 1953, as cited in Merskey & Bogduk, 1994), and is defined as persistent and recurrent pain, lasting for at least three months (Merskey & Bogduk, 1994). Pain can be distinguished in three categories: nociceptive pain is pain caused by tissue damage; neuropathic pain is pain caused by dysfunction in the nervous system; and idiopathic pain is pain with no identified cause (Norwegian Institute of Public Health, 2011). While pain earlier was viewed more strictly as a sensorial reaction to stimulation of nociceptors, there is today a general agreement about the notion that pain is not only of a physical character (Asmundson & Katz, 2009). According to the biopsychosocial model an individual’s perception of pain is influenced by the interaction of physical, psychological and social factors (Gatchel, Peng, Peters, Fuchs, & Turk, 2007; Skrove, Romundstad, & Indredavik, 2015). Hence, physical health and pain symptoms are not only related to the physiological presence of an abnormality, but are also influenced by psychological and social factors. Thus, pain is also a subjective matter, as opposed to strictly an objective one. Still, the research of Ojala et al. (2014) found that patients with pain without an identifiable pathology was met with disbelief. This indicates that the Cartesian mind body dualism is still dominant in the understanding of chronic pain (Ojala et al., 2014).

In children and adolescents, stomachache, headache, and musculoskeletal pain are the most common somatic health complaints (Egger, Costello, Erkanli, & Angold, 1999; Garber, Walker, & Zeman, 1991; Haugland, Wold, Stevenson, Aaroe, & Woynarowska, 2001; Perquin et al., 2000). The prevalence rate of chronic pain in Norwegian children and adolescents is poorly mapped, but the Health Interview Study of 2005 indicated a proxy-reported prevalence of 6% in children (6-10 years) and 12% in adolescents (11-15 years)

(Norwegian Institute of Public Health, 2011). A systematic review of chronic pain in children and adolescents shows that the prevalence rates in different studies are highly discrepant; the prevalence of headache was found to be 8-83%, abdominal pain 4-53%, back pain 14-24%, musculoskeletal pain 4-40%, multiple pains 4-49%, and other pains 5-88% (King et al., 2011). Most studies find that girls report more physical health complaints and chronic pain than boys, and that this pattern persists through the life course (Farruggia & Sorkin, 2009; Hunfeld et al., 2001; King et al., 2011; Luntamo et al., 2012; Myrtveit et al., 2014; Skrove et al., 2015). The same results are found in studies of adolescents in the general out-of-home care population, as well as in RYC (Farruggia & Sorkin, 2009; Nelson et al., 2011). Family factors have been linked to the presence of chronic pain in children and adolescents. A review of family functioning in families of children and adolescents with chronic pain showed, in fact, that the majority of studies reported poorer family functioning (e.g. more conflict) compared to healthy controls or population norms (Lewandowski, Palermo, Stinson, Handley, & Chambers, 2010). Further, children who had witnessed intimate partner violence in the family reported more physical health complaints, including more pain, compared to children who had not witnessed such violence (Lamers-Winkelmann, De Schipper, & Oosterman, 2012). These studies imply an influence of psychosocial factors on pain, factors that probably have not been uncommon in the lives of adolescents in the RYC. In sum, previous studies indicate an association between negative life experiences and health-complaints, including chronic pain. In the following sections, a summary of the findings in a systematic review by King et al. (2011) of pain prevalence and pain characteristics in headache, abdominal pain, musculoskeletal pain and multiple pains in children and adolescents will be presented.

Headache. Age is an important influence factor to headache in children and adolescents. The prevalence rate of headache increases with increasing age. The majority of the studies reporting sex differences in the prevalence of headache report a higher prevalence

in girls compared to boys. This has been found in both children and adolescents, but the sex difference is more pronounced with older age. Low socioeconomic status (SES) has been suggested as a psychosocial factor associated with headache. However, the evidence for such associations is conflicting. It was commonly found that SES tended to interact with factors such as sex and age in the influence on headache, and thus limiting the impact of SES. Other psychosocial factors have been found more significantly associated with headache.

Depression, anxiety, and a family history of headache are strongly linked with headache. In girls, but not in boys, low self-esteem has also been found as a significant impact factor.

Abdominal pain. Abdominal pain is, in contrast to headache, more strongly associated with lower age. Several studies report that the prevalence rates increase with age in early childhood, but flatten out and decrease in older children (Kristjansdottir, 1996, in King et al., 2011). Some studies did, however, not find any such age effects (Boey & Yap, 2000; Oh, Aw, Chan, Tan, & Quak, 2004, in King et al., 2011). Girls report a higher prevalence of abdominal pain compared to boys. As with headache, the evidence of the impact of SES has been found to be conflicting. For example has both high and low SES been associated with the presence of abdominal pain. Anxiety and depression have been found to be significantly associated with abdominal pain in children. Maternal anxiety and school stress are among other factors found to be associated with abdominal pain.

Musculoskeletal pain/limb pain. The prevalence rates of musculoskeletal pain increase with age. As for sex differences, the majority of the studies in King's (2011) review reported a higher prevalence of musculoskeletal pain in girls compared to boys. One study reported, however, increased rates of musculoskeletal pain in boys compared to girls (Rhee, Miles, Halpern, & Holditch-Davis, 1996, in King et al., 2011). There has also been found sex differences in respect to musculoskeletal pain sites. According to one study, girls reported significantly more pain in abdomen, back, neck, head and shoulders compared to boys,

whereas boys reported significantly more knee pain compared to girls (Smedbraten, Natvig, Rutle, & Bruusgaard, 1998, in King et al., 2011). The same study also found that girls are more likely to report pain in more body parts compared to boys, and that girls also reported more frequent pain. Few studies have examined psychosocial factors in relation to musculoskeletal pain. However, one study examined psychological functioning, and reported that feeling sad was associated with pain in girls, but no such associations was found for boys (Smedbråten, Natvig, & Bruusgaard, 1996, in King et al., 2011).

Multiple pains. Regarding age differences in multiple pains, the study results seem to indicate that this depends on the number of symptoms, pain sites and pain combinations (Brun Sunblad, Saartok, & Engstrom, 2007, in King et al., 2011). As for sex differences, the picture is to a large degree similar to the ones of single pains, with girls reporting more multiple pains symptoms compared to boys. Yet, this did to some degree depend on the specific pain combinations. A study examining the association between psychosocial factors and multiple pains reported a significant correlation between chronic health problems and frequent change of residence, poor performance at school, frequent television watching, and fewer interactions with other children. Also, they did not find any significant correlation with neither family structure nor SES, and multiple pains (Bakoula, Kapi, Veltsista, Kavadias, & Kolaitis, 2006, in King et al., 2011).

Chronic pain and psychiatric disorders

Chronic pain has been linked to the presence of psychiatric disorders. Psychiatric disorders have in accordance with the biopsychosocial model been found to be associated with chronic pain in both clinical and unselected, non-clinical populations of children and adolescents (Campo et al., 2004; Egger et al., 1999; Knook et al., 2011; Skrove et al., 2015). It has been found gender specific patterns between psychopathology and somatic complaints (Egger et al., 1999). The association between somatic complaints and affective disorders has

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

been found stronger in girls than in boys, whereas the association between disruptive behavior disorders and somatic complaints was found to be stronger for boys than for girls (Egger et al., 1999). Regarding adolescents in long-term foster care, Woods, Farineau and McWey (2013) reported that adolescents with chronic illness self-reported significantly greater internalizing problems than adolescents without a chronic health condition. The caregivers also reported higher rates of internalizing problems in adolescents with chronic illness compared to those without. In addition, adolescents with chronic illness also reported significantly greater overall behavior problems (Woods, Farineau, & McWey, 2013). In a Finnish study of children referred for unexplained pain, chronic headache in particular predicted mental illness, compared to musculoskeletal pain; being referred for chronic headache was associated with a 3-times higher risk of having an additional psychiatric disorder (Knook et al., 2011). In a study of patients in the Norwegian CAMHS, chronic pain was found in 70% percent of the adolescents who had a psychiatric disorder (N = 566); thus giving a higher frequency compared to the general population. The highest prevalence was found in those with mood and anxiety disorder, with 79% and 76% respectively reporting chronic pain, with chronic musculoskeletal pain as the most frequent type of pain. Among adolescents with mood- and anxiety disorders, chronic musculoskeletal pain was the most frequent type of pain (66% and 64% respectively), and among those with hyperkinetic disorders, the most prevalent pain condition was chronic pain (66%) and musculoskeletal pain (55%) (Mangerud, Bjerkeset, Lydersen, & Indredavik, 2013). As some research indicates different pain locations across different psychiatric disorder, others argue that the association between pain symptoms and psychiatric disorder depends on the frequency and coexistence of multiple frequent pains, rather than pain type or localization (Larsson & Sund, 2007). Although the often-observed co-occurrence between abdominal pain, headache and musculoskeletal pain, and psychiatric disorders are established, the specific mechanism

behind this association is unclear (Boey & Goh, 2002; Luntamo et al., 2012; Powers, Gilman, & Hershey, 2006).

Health-Related Quality of Life

The World Health Organization defines health as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (World Health Organization, 1947). Relatedly, the term Quality of Life (QOL) is defined as “the individual’s 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” (The WHOQOL Group, 1998). Taking these elements into account, Health-Related Quality of Life (HRQOL) is viewed as a multidimensional construct that captures the subjective experience of functioning on the physical, psychological and social aspects of health (Jud, Landolt, Tatalias, Lach, & Lips, 2013). It is reasonable to believe that the developmental perspective is important to take into account considering HRQOL in adolescents. They are in between childhood and adulthood, a period that is characterized by vast physical, social and emotional changes. Strive for autonomy, physical maturation and body image, peer relationships, and intimacy and sexuality are important developmental tasks or issues at this stage (Frisen, 2007). Adding on to this, a Norwegian study identified a positive self-image, good family relations, and good friends as important factors to adolescent’s HRQOL (Helseth & Misvaer, 2010).

As there is some research on various aspects of the mental, physical and social status of adolescents in the RYC population, the research on the broader health-related quality of life is scarce. As mentioned, youths in RYC in Norway rate their physical well-being as poorer than youths in the general population and in CAMHS (Jozefiak & Sønnichsen Kayed, 2015). Other studies have also found lower HRQOL in the out-of-home care population. In one study adolescents living in home-based foster care had poorer HRQOL on several

domains compared to adolescents in the general community (Carbone, Sawyer, Searle, & Robinson, 2007). According to the authors, this was partly attributable to the higher prevalence of mental health problems in this population. This was also the case in a study of girls in a Chilean children's home for sexually abused or emotionally and physically neglected girls (Seiler, Kohler, Ruf-Leuschner, & Landolt, 2015). The study group reported significantly poorer HRQOL than controls, particularly for the KIDSCREEN subscales "physical well-being", "psychological well-being" and "parental relationships and autonomy". A Serbian study found that children and adolescents living in residential care reported significantly lower quality of life than children and adolescents living in foster care or biological families (Van Damme-Ostapowicz et al., 2007). A similar pattern was also found in another Serbian study, in which the HRQOL in children and adolescents living in residential care were significantly poorer than that of those living in foster care and biological families (Damnjanovic et al., 2012). A Scottish study did, on the other hand, not find any significant differences in HRQOL between adolescents in a residential care facility and a control group from a local school (Carroll, Duffy, & Martin, 2014).

Chronic pain and psychiatric disorders are both conditions associated with lower HRQOL (Gold et al., 2009; Sawyer et al., 2002). Children and adolescents with chronic pain have significantly lower HRQOL compared to children in the general population and children with other chronic conditions (Gold et al., 2009). The BELLA study of the general population in Germany reported large impairments in HRQOL, as measured with KINDL, in children and adolescents suffering from mental health problems (Ulrike Ravens-Sieberer et al., 2008). Impaired HRQOL, as measured with PedsQL, are also reported in a study of children with diagnosed psychiatric disorders (Varni, Limbers, & Burwinkle, 2007). A study of HRQOL in Norwegian child- and adolescent psychiatric outpatients compared to students in the general population found that the former had significantly worse HRQOL, measured with KINDL,

even when the two groups were matched on emotional- and behavioral problems (Jozefiak, Larsson, Wichstrom, Wallander, & Mattejat, 2010). Considering the research indicating lower HRQOL in children and adolescents with chronic pain or mental health problems, one can hypothesize that having both a psychiatric disorder and chronic pain affects the HRQOL more negatively compared to having one of the conditions.

There is a general agreement regarding the need for assessment of psychiatric disorders in chronic pain patients, and assessment for chronic pain in psychiatric patients (Subramaniam, Vaingankar, Abdin, & Chong, 2013). Follow-up studies demonstrate that for a substantial number of individuals, childhood chronic pain tends to persist (Brattberg, 2004; El-Metwally, Salminen, Auvinen, Kautiainen, & Mikkelsen, 2004, 2005; Jones & Macfarlane, 2009; Knook, Lijmer, Konijnenberg, Taminiau, & van Engeland, 2012; Perquin et al., 2003). Children and adolescents experiencing chronic pain frequently continue to display chronic pain symptoms (Brattberg, 2004; Fearon & Hotopf, 2001; Knook et al., 2012), as well as psychiatric disorders (Hotopf, Carr, Mayou, Wadsworth, & Wessely, 1998; Knook et al., 2012) in adolescence and adulthood. Considering this research, it is clearly a need for measurements of more than “the absence of disease or infirmity” in the RYC. In order to improve the lives of these children and adolescents, there is a need to evaluate the possible factors that may be confounding this objective. Measurements of HRQOL might be a useful tool in this regard.

To sum up, children and adolescents in RYC are considered a high-risk population due to the prevalence and impact of negative life experiences. Also, it is clear that this population is at higher risk of psychiatric illness (Jozefiak et al., 2015). Mental illness have in both clinical populations and in the general population been linked with a higher prevalence of chronic pain. In light of this knowledge, I want to explore the associations between chronic pain and psychiatric disorders, as well as the associations between psychiatric disorders and

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

chronic pain location in adolescents in the Norwegian RYC. In addition I want to explore the impact of chronic pain and psychiatric disorders on the health-related quality of life in this population. To my knowledge no studies have investigated the prevalence of chronic pain in a RYC population. In fact, it has not been possible to obtain any report on chronic pain in the whole out-of-home care population other than general physical health. Also, to my knowledge, there are no studies that have investigated the impact of chronic pain and mental disorders on HRQOL in a RYC population, even though this is a population at risk for impaired mental and physical health.

Aim and hypothesis

To explore which kind of pain is the most frequent across the sample of adolescents in RYC as a whole, and across the psychiatric diagnoses.

Hypotheses 1: Adolescents with a psychiatric disorder will have higher prevalence of chronic pain compared to adolescents without a psychiatric disorder.

Hypotheses 2: Girls will have a higher prevalence of chronic pain compared to boys, and the general prevalence of chronic pain will increase with age.

Hypothesis 3: Adolescents with both a psychiatric disorder and chronic pain will have lower HRQOL compared to adolescents who have either a psychiatric disorder, chronic pain or none of the two.

Methods

The data in this paper was obtained from the Norwegian research project *Mental Health in Adolescent Residents in the Child Welfare System* (Sønnichsen Kayed et al., 2015).

Participants and recruitment

The inclusion criteria for participation in this study were adolescents between 12–20 years of age and living in a child welfare institution. Exclusion criteria were being an unaccompanied minor without asylum in Norway, being in acute placement, and/or having insufficient language qualifications in Norwegian to be interviewed. All child welfare institutions in Norway hosting adolescents aged 12–20 years were invited to participate in the study. After the initial exclusion, 98 (N = 731) of 163 (N = 1600) institutions were available. A total of 70 adolescents were excluded from the study based on the exclusion criteria. 12 institutions did not want to participate ($n = 60$). The total of participants in the study came from 86 institutions and were 601 available adolescents. Finally, 400 of the 601 available adolescents participated, yielding a response rate of 67%. The final sample consisted of 230 girls, mean age = 16.9; $SD = 1.2$ and 170 boys, mean age = 16.5; $SD = 1.5$. The number of adolescents that completed the psychiatric interview was 335; the number of adolescents that completed the KINDL was 300; whereas 330 completed the CAPA for pain symptoms.

In order to rule out the possibility of a non-representative data sample there was performed an analysis of the CBCL data of the 400 participants as well as 141 anonymous non-participants. A Bayesian multiple imputation (MI) were conducted. The results showed small differences between participants and non-participants, thereby confirming the representativeness of the participants completing the diagnostic interview (Sønnichsen Kayed et al., 2015).

Procedures

The data acquisition was carried out by four trained research assistants, and the data was collected at the respective institutions. In order to obtain satisfactory data, each adolescent were interviewed personally with structured psychiatric interviews. Questionnaires were collected from the adolescents, their principal contacts and the leaders of the institutions. The data was collected between June 2011 and July 2014.

Instruments

CAPA.

Psychiatric diagnostic interview. The Child and Adolescent Psychiatric Assessment (CAPA) is a semi-structured, standardized child- and adolescent psychiatric interview. It collects information regarding the onset, duration, intensity and frequency of symptoms of psychiatric diagnoses in accordance with DSM-IV criteria (Angold & Costello, 2000). The CAPA consists of distinct modules, which can be used separately. The adolescents themselves were interviewees in the clinical interview. However, there is some discussion in the scientific field concerning the reliability of self-report in the assessment of ADHD, attachment disorder and autism spectrum disorders (Mazefsky, Kao, & Oswald, 2011; Owens, Goldfine, Evangelista, Hoza, & Kaiser, 2007; Swanson, Owens, & Hinshaw, 2012). Symptoms of these disorders were therefore acquired from the primary contact at the institution. In these cases the parent version of CAPA, PAPA (Angold & Costello, 2000) were used. A previously given ADHD diagnosis were accepted even when the symptoms were subthreshold, given the possible effect of medication or other ongoing therapy. The variables are organized in ADHD and three diagnostic categories: anxiety disorders include GAD, panic disorder, agoraphobia and social phobia; depressive disorders include depressive disorder, dysthymia and depressive disorder Not Otherwise Specified; behavior disorders includes conduct disorder and oppositional defiant disorder.

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

The CAPA has obtained satisfactory test-retest reliability with a kappa score range from $\kappa = 0.55$ for conduct disorder (CD) and to $\kappa = 1.0$ for substance abuse/dependence (Angold & Costello, 2000).

Chronic pain measurement. In addition to psychiatric symptoms, the CAPA also contains a non-standardized somatization module for physical symptoms. The interview contains questions regarding the onset, duration, frequency, medical assistance, school or work absence, and functional impairment. In this study, we wanted to focus on the most common types of pain (Egger et al., 1999; Garber et al., 1991; Haugland et al., 2001). Therefore we used the following items from this module: abdominal pain, headache, and musculoskeletal pain.

The pain intensity for headache and abdominal pain are rated as either 0 or 2, where 0 = no pain, and 2 = pain with a duration for a minimum of 1 hour, minimum once each week, and that has persisted every week for the primary period (last 3 months). The pain intensity ratings for musculoskeletal pain are rated as 0 = no pain, 2 = pain for a minimum of 3 times a week in the primary period, and 3 = pain is present almost at all times. Chronic pain was thus defined as having pain for a duration for a minimum of 1 hour, minimum once a week, and that has persisted every week for the last three months. For the musculoskeletal pain variable, value = 2 and value = 3 were merged in order to compare the scores of the three chronic pain variables.

KINDL. HRQOL was measured using the Kinder Lebensqualität Fragebogen (Questionnaire for Measuring Health-related Quality of Life in Children and Adolescents, revised version, KINDL-R) (Ravens-Sieberer & Bullinger, 2000). The KINDL was administered using self-report. KINDL-R consists of the six subscales physical well-being, emotional well-being, self-esteem, family, friends, and everyday functioning (school, kindergarten etc.), with an overall number of 24 items (Bullinger, Bruett, Erhart, & Ravens-

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

Sieberer, 2008). The respondents are to respond on a 5-point Likert scale (1 = never, 5 = always). Mean item scores are calculated for all subscales into a 0 to 100 scale, where 100 indicates very high QoL (Jozefiak & Sønnichsen Kayed, 2015). Alpha in the RYC sample was .90 (.53 for the School subscale and from .72 to .88 for the remaining subscales) (Jozefiak & Sønnichsen Kayed, 2015). KINDL-R has been proven to be a psychometrically acceptable method for the measure of quality of life in children (Bullinger et al., 2008). The adolescents in the target population did not live together with their families. Therefore only 5 of the subscales were used in this study, by excluding the items of the “family” subscale. There was a large structural missing percentage on the subscale “School”, due to 29% of the adolescents in the study not attending school, and the school subscale was only distributed to those attending school.

CBCL. The Child Behavior Check List (CBCL) for children and adolescents from 6-18 years (Achenbach & Rescorla, 2001) were used in order to compare participants and non-participants. The CBCL consists of 118 Likert type questions and two open-ended questions, rated on a scale from 0 – 2 (0 = not true, 2 = very true, often true). The scoring system yields a “total problem score” from 0-240.

Ethics

The Norwegian Regional Committee for Medical and Health Research Ethics approved the main study (Number of reference: 2010/1965/REK midt). The committee also approved acquisition of anonymous CBCL scores and information about age and gender for non-participants, in order to compare participants and non-participants. Written informed consent was obtained from every participant. In those cases the participant was under the age of 16, consent was in addition obtained from the adolescent’s guardian.

Statistics

The data were analyzed using SPSS version 21 for OS X (SPSS INC., Chicago, IL, USA). A descriptive analysis was carried out for the prevalence of chronic pain and HRQOL across gender and psychiatric diagnosis. Because the pain variable is non-continuous, the non-parametric Kendall's tau-B (τ_b) correlation coefficient was used in the analysis of age and presence of pain. The chronic pain variables (abdominal pain, headache and musculoskeletal pain) were recoded into one continuous variable (with a value from 0-3) in order to analyze gender effects on chronic pain of any kind with independent samples t-test. The chronic pain variables were also separately recoded to 0 = no chronic pain, 1 = chronic pain. A chi square analysis was performed to analyze the association between psychiatric disorders and chronic pain. A one-way analysis of variance (ANOVA) was performed to test hypothesis 3 whether having both chronic pain and a psychiatric diagnosis gives significant outcomes on HRQOL. Two-sided *P* values of < 0.05 were considered statistically significant, and 95% confidence intervals (CI) are reported where it is relevant.

Results

Frequency of chronic pain

In the total sample ($n = 330$), 42.0% reported chronic pain. 17.5% reported abdominal pain, 27.0% reported headache, and 17.8% reported musculoskeletal pain, whereas 6.0% experienced musculoskeletal pain nearly at all times. Among adolescents who had a psychiatric diagnosis ($n = 228$), 59.6% reported chronic pain. 23.1% of the adolescents with a psychiatric disorder reported chronic abdominal pain, 35.5% reported chronic headache, and 30.3% reported chronic musculoskeletal pain in which 6.8% reported musculoskeletal pain all the time in the primary period. Adolescents with emotional- and anxiety disorders had the highest prevalence of pain (see Table 1).

Table 1

Frequency of chronic pain and pain location across psychiatric disorders

	Total sample	Mood disorders	Anxiety disorders	Behavioral disorders	Hyperkinetic disorder
	<i>N</i> = 400	<i>n</i> =125	<i>n</i> =117	<i>n</i> =70	<i>n</i> =129
Abdominal pain <i>n</i> = 331	70/331 (17.5)	42/124 (33.6)	38/117 (32.5)	16/70 (22.9)	18/104 (14.0)
Headache <i>n</i> = 332	108/332 (27.0)	64/124 (51.2)	56/117 (47.9)	26/70 (37.1)	36/104 (27.9)
Musculoskeletal pain <i>n</i> = 331	95/331 (23.8)	48/123 (39.0)	49/116 (42.2)	23/70 (32.9)	37/104 (28.7)
Any type of pain <i>n</i> = 330	168/330 (42.0)	92/123 (73.6)	79/116 (67.5)	39/70 (55.7)	58/104 (45.0)

¹ Table 1 shows a total of 125 who met the diagnostic criteria for any depressive disorder ($n = 335$), 117 met the criteria for any anxiety disorder ($n = 335$), 70 met the criteria for a behavioral disorder ($n = 335$), and 129 met the criteria for ADHD ($n = 399$).

² Percentage of total having chronic pain in parenthesis.

Associations between psychiatric disorders and chronic pain

A Pearson’s chi-square test was performed to test the association between the presence of a psychiatric disorder and chronic pain. The results showed a significant association, $\chi^2 =$

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

25.727, $p < 0.001$, odds ratio = 3.49, between having a psychiatric disorder and having chronic abdominal pain, headache and/or musculoskeletal pain. Also, the odds for having chronic pain when having a psychiatric disorder was 3.49 times greater than when not having a psychiatric disorder.

A closer look at the specific psychiatric disorders and chronic pain locations (Table 2) shows that depressive disorders and anxiety disorders were significantly associated with headache, abdominal pain and musculoskeletal pain. There was, however, not a significant association between ADHD and any type of chronic pain, or between behavior disorders and any type of chronic pain.

Table 2
Chi square analysis of chronic pain and psychiatric disorders

	Any pain location				Headache				Abdominal pain				Musculoskeletal pain			
	<i>n</i>	χ^2	<i>p</i>	<i>df</i>	<i>n</i>	χ^2	<i>p</i>	<i>df</i>	<i>n</i>	χ^2	<i>p</i>	<i>df</i>	<i>n</i>	χ^2	<i>p</i>	<i>df</i>
ADHD	330	1.435	.231	1	332	.300	.584	1	331	1.341	.247	1	331	3.504	.061	1
Behavior disorders	330	.821	.365	1	332	.860	.354	1	331	.156	.693	1	331	.749	.387	1
Depressive disorders	330	44.771	.000	1	332	32.839	.000	1	331	19.247	.000	1	331	10.194	.001	1
Anxiety disorders	331	21.161	.000	1	332	19.353	.000	1	331	13.932	.000	1	331	16.001	.000	1

¹ Significant findings in bold text. $p = < .05$.

² Total $N = 400$.

When adjusting for sex (see Table 3), there was a statistically significant association between boys with ADHD and headache $\chi^2 (1, n = 136) = 4.12, p < 0.05$, but not in girls with ADHD $\chi^2 (1, n = 196) = .28, p = .59$. There was no significant relation between ADHD and the other types of chronic pain, regardless of sex. There were also significant associations between depressive disorders and headache and musculoskeletal pain in both boys and girls. There was a significant association between depressive disorders and abdominal pain in girls, but not in boys. In anxiety disorders, there was a significant association for all the three pain conditions in girls, but no such findings appeared for boys.

Table 3
Chi square analysis of chronic pain and psychiatric disorders adjusted for sex

	Sex	n	Any pain location						Headache						Abdominal pain						Musculoskeletal pain									
			χ^2		p		OR		95% CI		n		X^2		p		OR		95% CI		n		χ^2		p		OR		95% CI	
			LB	UB	LB	UB	LB	UB	LB	UB	LB	UB	LB	UB	LB	UB	LB	UB	LB	UB	LB	UB	LB	UB	LB	UB	LB	UB		
ADHD	M	136	3.66	.06	2.03	.98	4.22	.98	4.12	.04	2.38	1.02	5.55	136	.03	.85	1.13	.31	4.08	136	1.55	.21	1.69	.74	3.89					
	F	194	.05	.82	1.08	.57	2.03	.28	.59	.84	.45	1.58	1.95	1.47	.23	.65	.32	1.31	195	2.41	.12	1.65	.87	3.13						
Behavior disorders	M	136	1.65	.20	1.64	.77	3.48	.13	.72	.18	.48	2.88	136	3.64	.06	3.21	.92	11.22	136	2.08	.15	1.86	.80	4.34						
	F	194	1.25	.26	1.61	.70	3.74	3.68	.06	2.14	.97	4.70	195	.16	.69	1.18	.52	2.71	195	.18	.67	1.19	.53	2.68						
Depressive disorders	M	136	6.56	.01	2.89	1.26	6.64	3.82	.05	2.44	.98	6.09	136	1.42	.23	2.18	.59	8.00	136	2.85	.09	2.15	.87	5.3						
	F	194	29.45	.00	5.62	2.94	10.75	20.68	.000	3.95	2.16	7.22	195	8.89	.003	2.59	1.37	4.87	195	4.53	.03	1.92	1.05	3.51						
Anxiety disorders	M	136	1.84	.18	1.7	.79	3.67	2.6	.11	2.04	.85	4.91	136	2.01	.16	2.42	.69	8.48	136	.73	.39	1.46	.61	3.51						
	F	194	17.44	.00	3.84	2.01	7.36	13.33	.000	2.98	1.64	5.39	195	7.77	.01	2.4	1.29	4.49	195	15.36	.000	3.78	1.82	6.28						

¹ Significant findings are in bold text. $P < .05$.

² Degrees of freedom in all cases = 1.

Effect of gender, age and placement statuses on chronic pain

A Kendall's tau-b correlation analysis was run to determine possible age effects to chronic pain. There was no significant correlation between age and prevalence of chronic pain ($\tau_b = .051, p = .301$). There was, however, a statistically significant difference in frequency of chronic pain (29.6% vs. 51.1%) between boys ($M = 0.51, SD = .75$) and girls ($M = 1.04, SD = .99$), $t_{(325.9)} = 5.518, p < 0.05$, 95% CI [-0.717, -0.34]. Further, Cohen's effect size value ($d = .61$) suggests a moderate to high practical significance. The adolescents in RYC are placed either voluntary or involuntary, and an analysis was performed to see whether placement status had any implications for chronic pain. The results were non-significant, and showed no relations between placement status and chronic pain, $\chi^2 = .17 (2, n = 330), p = .92$. Further, there was no significant associations when separating girls and boys in the analysis, respectively $\chi^2 = .59 (2, n = 194), p = .75$, vs. $\chi^2 = .33 (2, n = 136), p = .85$.

Health-Related Quality of life in adolescents with chronic pain and psychiatric disorders

Mean HRQOL in the total sample was 59.26. The mean score for boys were 66.72 ($SD = 16.4$), whereas the mean score for girls were 53.56 ($SD = 18.8$). Hypothesis 3 stated that adolescents with both a chronic pain condition and a psychiatric disorder would have lower HRQOL compared to adolescents with either one of the conditions (having a psychiatric disorder *or* having chronic pain) and compared with adolescents with neither chronic pain nor a psychiatric disorder. A one-way analysis of variance (ANOVA) showed that there was a significant effect of psychiatric disorders and chronic pain on the level of Health Related Quality of Life, $F(3, 256) = 37.89, p < 0.001$.

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

Table 4
Bonferroni comparisons of chronic pain and psychiatric disorder on HRQOL

Comparisons	Mean HRQOL Difference	Std. Error	95% CI	
			Lower Bound	Upper Bound
Neither conditions vs. CP	10.58	3.56	1.11	20.04
Neither conditions vs. PD	8.23	2.76	0.88	15.58
CP vs. PD	- 2.35	3.53	-11.72	7.02
PD+CP vs. no conditions	-25.27	2.51	-31.94	-18.6
PD+CP vs. CP	-14.69	3.33	-23.54	-5.85
PD+CP vs. PD	-17.04	2.46	-23.58	-10.5

¹ Statistically significant findings in bold text ($p = <.05$).

² Abbreviations: PD = having any type of psychiatric disorder, CP = having any type of chronic pain, CP+PD = having both chronic pain *and* a psychiatric disorder.

Post Hoc comparisons using the Bonferroni correction revealed that adolescents who did not have either chronic pain or a psychiatric disorder had statistically significant higher HRQOL compared both with adolescents with a psychiatric disorder (72.96 ± 14.47 vs. 64.73 ± 14.41 , $p < 0.05$), and with adolescents with chronic pain (72.96 ± 14.47 vs. 62.38 ± 13.41 , $p < 0.05$). There were no statistically significant differences in HRQOL between adolescents who had a psychiatric disorder and adolescents who had chronic pain (64.73 ± 14.41 vs. 62.38 ± 13.41). However, adolescents having both a psychiatric disorder *and* chronic pain reported significantly lower HRQOL compared with having one of the conditions or having none: adolescents with both a psychiatric disorder *and* chronic pain compared with adolescents with chronic pain (47.68 ± 17.46 vs. 62.38 ± 13.41 , $p < 0.001$), adolescents with both a psychiatric disorder *and* chronic pain compared with adolescents with a psychiatric disorder (47.68 ± 17.46 vs. 64.73 ± 14.41 , $p < 0.001$), adolescents with both a psychiatric disorder *and* chronic pain compared with adolescents having neither chronic pain nor a psychiatric disorder (47.68 ± 17.46 vs. 72.96 ± 14.47 , $p < 0.001$).

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

These findings indicate that having chronic pain, a psychiatric disorder, or both, is associated with lower health-related Quality of Life, when comparing with adolescents who don't have chronic pain or a psychiatric disorder. Also, having both chronic pain *and* a psychiatric disorder are associated with considerably lower health-related Quality of Life compared with adolescents having just one of the conditions.

Discussion

To my knowledge, this was the first study that investigated chronic pain prevalence, chronic pain across psychiatric disorders, and the impact of psychiatric disorders and chronic pain on HRQOL, in a population of adolescents in RYC. The major findings of this paper are that adolescents in RYC have a prevalence of chronic pain higher than that of the general population, and at a level comparable with that of adolescents in the CAMHS. Age and placement status did not have any statistically significant effect on chronic pain. Having a psychiatric disorder is significantly associated with chronic pain, but this effect is sex dependent. Depressive disorders are associated with chronic pain in both boys and girls, and anxiety disorders are associated with chronic pain in girls only. Having either chronic pain or a psychiatric disorder is significantly associated with impaired HRQOL, but HRQOL is particularly impaired in adolescents having both chronic pain and a psychiatric disorder.

Prevalence

Children and adolescents in out-of-home care are considered to be at risk of poorer physical health compared to adolescents in the general population (Simms et al., 2000). This research is based on populations other than the Norwegian or Scandinavian, and may therefore not be directly comparable to the Norwegian conditions. For example, the Norwegian welfare system and health care system may prevent some physical health issues more commonly found in the out-of-home care populations in other countries (e.g. skin infections). However, given the research documenting the influence of psychosocial factors on chronic pain, it was expected to find outcomes on this factor. In this study, 42% of the adolescents in the RYC reported chronic pain. This is a considerably higher prevalence than in the general population in Norway, which is estimated by the Norwegian Institute of Public Health to be 12% in the age segment 11-15 years (Norwegian Institute of Public Health, 2011). They used parent proxy-report in their pain study whereas this study used self-report,

which might have confounded the basis for comparison. A study found agreement between children and their parents on both pain intensity and disability (Vetter, Bridgewater, Ascherman, Madan-Swain, & McGwin, 2014). The prevalence rate by the Norwegian Institute of Public Health is therefore evaluated as a valid reference basis.

Among the adolescents with a psychiatric disorder, 59.6% reported having chronic pain. The prevalence of chronic pain in the Norwegian CAMHS is reported to be 70% (Mangerud et al., 2013). Acknowledging the fact that the prevalence rate of psychiatric DSM-IV disorders in the RYC population is 76.2% (Jozefiak et al., 2015), these findings are not surprising. One can say the RYC population is in closer resemblance to the CAMHS than the general population in terms of impaired physical health; not only adolescents with a psychiatric disorder, but the RYC population as a whole.

Sex differences, age effects and placement status

Girls reported a significantly higher frequency of chronic pain than boys did (51.1% vs. 29.6%), which is the general finding in other studies (King et al., 2011). The ratio of sex differences in chronic pain change concurrently with changes in sex hormones as an effect of age (Melzack, 2001). Especially have the focus been on the influence estrogen has on the release of peripheral cytokines, which in turn increases the cortisol levels (Wiesenfeld-Hallin, 2005). Cortisol is a stress hormone that enhances nociception (Garland, 2012). It is suggested that sex hormones influences pain sensitivity, and that stages in the menstrual cycle influences pain threshold and pain intensity (Wiesenfeld-Hallin, 2005). The research of hormonal influence of pain is, however, inconsistent (Fillingim, King, Ribeiro-Dasilva, Rahim-Williams, & Riley, 2009).

The findings do not show an association between age and chronic pain, which is surprising given that the majority of other studies often finds this pattern (King et al., 2011). It might have been a different result if the effect of age was controlled for gender. Also, the

present study did not separate the different pain locations in the analysis of the relationship between age and chronic pain. As abdominal pain is associated with lower age in contrast to headache and musculoskeletal pain, which is associated with higher age (King et al., 2011), it is possible that the abdominal pain variable concealed a potential age effect.

The findings do also not indicate that being voluntarily or involuntarily in placement have an effect on reported chronic pain, even when controlling for gender. According to the different paragraphs in the Norwegian Child Welfare Act, children and adolescents can be placed either voluntarily (§ 4.4 and § 4.26) or involuntarily (§ 4.12 and 4.24). This involves that voluntary placements can be either according to the child's consent or the parent's consent. One way to interpret the results is that the categories voluntarily/involuntarily does not separate the adolescents who agreed to placement in RYC, and those who did not. Therefore one can suspect that this interferes with a possible effect. Also, one can presume there is a good reason behind the placements in the child welfare system, and therefore speculate that also involuntary placements might lead to positive outcomes. However, involuntary placements imply more grave situations.

Chronic pain across psychiatric disorders

In the study by Mangerud et al. (2013), chronic musculoskeletal pain was the most frequent type of pain among adolescents with a psychiatric disorder. It was also found that chronic musculoskeletal pain was the most frequent type of pain among adolescents with mood- and anxiety disorders (Mangerud et al., 2013). In the present study, the most prevalent type of pain across all adolescents was headache (27.0%), which was also the case among adolescents with psychiatric disorders (35.5%). This is in line with other studies (Larsson & Sund, 2007; Perquin et al., 2000). Related to this, headache has been found to be the strongest predictor of psychiatric morbidity (Knook et al., 2011).

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

The results of this study show that there was a significant association between having a psychiatric disorder and having chronic pain. This association was, however, not present in all the psychiatric diagnosis. There is a significant association between depressive- and anxiety disorders and chronic pain, whereas behavioral disorders are not associated with any type of chronic pain. These results are in accordance with previous studies, which also find an association between chronic pain, and depression and anxiety (McWilliams, Goodwin, & Cox, 2004). However, when the analysis of chronic pain and psychiatric disorders were performed by gender, the results were more nuanced. In Mangerud et al. (2013), there was no difference in risk of chronic pain between mood- and anxiety disorders versus hyperkinetic disorder when adjusted for sex. This finding is not supported by the results of this study. ADHD was associated with headache in boys, but not in girls. ADHD was not related to any other type of pain, regardless of sex. Depressive disorders were, on the other hand, significantly related to abdominal pain, headache, and musculoskeletal pain in girls, and headache and musculoskeletal pain in boys. Anxiety disorders were significantly associated with abdominal pain, headache and musculoskeletal pain in girls, but were not associated with any type of chronic pain in boys. These results reflect the general picture in which girls are more prone to report chronic pain compared to boys. Especially anxiety disorders stand out in these results as sex dependent in the frequency of chronic pain. However, research indicates evidence for anxiety as more strongly associated with pain response in males compared with females (Fillingim et al., 2009). Females report higher levels of anxiety sensitivity, and the association between anxiety sensitivity and pain has been found mediated by a negative interpretation of bodily sensations (Fillingim et al., 2009). According to Fillingim et al. (2009), anxiety sensitivity might therefore be a contributing factor in the sex differences in pain response. The anxiety disorders in the analysis of this study were grouped into one

anxiety variable, which might have impacted the findings compared to performing the analysis of the specific anxiety disorders.

Mangerud et al. (2013) and others (Arruda, Guidetti, Galli, Albuquerque, & Bigal, 2010; Holmberg & Hjern, 2006) have found somewhat different prevalence of pain locations across the psychiatric disorders than what was found in this study. The conflicting findings in this paper and others with regard to the link between specific pain locations and specific psychiatric disorders might be that the different results reflect a general sensitivity for chronic pain of different expressions rather than a specific sensitivity for specific types of pain. The search after specific types of pain locations in specific psychiatric disorders might either be a dead end in terms of being better explained by a general sensitivity, or the result of different methodological approaches regarding types of pain being studied or length of the presence of pain in order to be characterized as chronic. A longitudinal study of 12-15 years old Norwegian school-children (Larsson & Sund, 2007) found that emotional- and behavioral problems depended on the frequency and coexistence of multiple pains rather than pain type or location. The study by Larsson and Sund (2007) indicates that multiple pains are of greater importance to internalizing and externalizing problems compared to single types of pain. Even though said study investigated the impact of pain on emotional- and behavioral problems, as opposed to psychiatric disorder categories, and in the general population, it adds on to the evidence of the possible unimportance of specific pain locations in the psychiatric diagnosis. Keyes et al. (2012) studied the impact of childhood maltreatment on externalizing and internalizing dimensions as opposed to specific psychiatric categories. They found that the association between childhood maltreatment and psychiatric disorders could be explained as an underlying liability to experience internalizing or externalizing psychopathology. The different results regarding different associations between specific types of chronic pain and

specific types of psychiatric disorders might reflect an underlying liability to non-specific pain locations.

However, the results are in line with the general findings in the literature; that depressive disorders and anxiety disorders in particular are associated with chronic pain. The precise mechanisms behind this association are not fully understood. Even so, pain is better understood in terms of a biopsychosocial model, and one must therefore consider the interactions between psychological, social and biological factors. The relationship between mental health issues and pain may go both ways. Several studies have found anxiety and depression to precede the onset of pain in children and adolescents (Larsson & Sund, 2007; Mulvaney, Lambert, Garber, & Walker, 2006; Stanford, Chambers, Biesanz, & Chen, 2008). Chronic pain may also have substantial impact on the functioning of the individual. Compared to healthy children, children with chronic pain experiences greater difficulties on important areas such as at school, in the family and socially (Ryee, 2011). Children and adolescents with chronic pain may be inhibited to participate in social activities. Pain may also be disruptive to school performance and attendance. Such impairments to the normal functioning may have a negative impact on the mental health of the individual.

According to Bair, Robinson, Katon, and Kroenke (2003), moderate to severe pain is associated with more symptoms and worse outcomes of depression. Depression and pain shares some anatomical pathways, and norepinephrine, serotonin and dopamine are strongly involved in the pathophysiology of both conditions (Chopra & Arora, 2013). Negative emotions are linked to increased activation in the amygdala, anterior cingulate cortex, and the anterior insula (Garland, 2012), which increases the intensity and frequency of pain (Keefe, Lumley, Anderson, Lynch, & Carson, 2001). There are studies indicating that chronic pain can lead to anatomical changes in brain regions involved with pain-modulation, cognition and emotion (Bushnell, Ceko, & Low, 2013). Pain is a sensation with potential to be salient to the

survival of the organism. It therefore attracts attention, voluntarily or automatic (Garland, 2012). Pain is perceived as more intense when the attention is directed to the pain experience, and as less intense when the attention is distracted from it (Garland, 2012). There have also been emphasized an attentional bias in anxiety in which there is a selective attention toward threat-related stimuli (Asmundson, Coons, Taylor, & Katz, 2002). This attentional bias toward monitoring of internal and/or external threats is often observed in individuals with chronic pain (Garland, 2012), also in children and adolescents (Boyer et al., 2006). Pain also involves a cognitive appraisal of the meaning of the sensory signals (Garland, 2012). The physiological sensations of pain may be interpreted in a catastrophic matter, which may increase the levels of anxiety (Nicolson, Caplan, Williams, & Stern, 2009) and pain intensity (Garland, 2012). Whether bodily sensations are interpreted as threatening depends on the belief that one is able to cope with that sensation, or not (Garland, 2012). The ventrolateral prefrontal cortex, a brain region involved in emotion regulation, is positively associated with controllability of pain, and negatively associated with subjective pain intensity (Garland, 2012). Thus, the co-occurrence of chronic pain and depressive- and anxiety disorders is linked through several possible mechanisms, which can lead to or exacerbate the symptoms.

Health-Related Quality of Life

As predicted, HRQOL was significantly lower in adolescents with chronic pain compared to adolescents without chronic pain. This is in line with the findings of Gold et al. (2009). Adolescents with a psychiatric disorder also had lower HRQOL compared to adolescents without a psychiatric disorder, which is also in accordance with previous studies (Sawyer et al., 2002). There was, however, no difference in HRQOL between adolescents with chronic pain and adolescents with a psychiatric disorder in the present study. It has been found that children with psychiatric disorders have lower HRQOL compared with children with physical health issues, such as diabetes, asthma, cancer and epilepsy (Bastiaansen, Koot,

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

Bongers, Varni, & Verhulst, 2004; Sawyer et al., 2002). The results of the present study indicate that psychiatric disorders and chronic pain generally had similar impact on HRQOL.

Previous studies have found significantly lower HRQOL with regard to physical health in RYC compared to controls, as measured with PedsQL (Damjanovic et al., 2012). Mangerud et al. (2013) reported that 70.4% of adolescents in the CAMHS have chronic pain that impair their daily lives. Comparing the results from the present study with the general population, the total HRQOL mean score in the general population are in a study found to be 68.2 (Jozefiak & Sønnichsen Kayed, 2015). The total self-reported HRQOL mean score in this study was 59.3. In comparison, the total HRQOL mean score for children and adolescents in CAHMS was in said study 62.8. Thus, the self-reported HRQOL in these three populations indicate that the RYC and CAMHS populations are at a similar level in terms of quality of life. In the study by Jozefiak and Sønnichsen Kayed (2015), the adolescents from the same sample as the present study rated their physical well-being even poorer than adolescents in CAHMS, and they rated their emotional well-being as poorly as adolescents in CAMHS did. As adolescents in this study have less chronic pain compared with adolescents in the CAMHS according to the study by Mangerud et al. (2013), this illustrates that not only physical and emotional health alone can explain the low levels of HRQOL in RYC.

Adolescence is a developmental period marked by central changes, physically, socially and emotionally. The prevalence rates of psychiatric disorders increase in adolescence (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Also, HRQOL have been found to decrease in this developmental period (Bisegger, Cloetta, von Rueden, Abel, & Ravens-Sieberer, 2005; Goldbeck, Schmitz, Besier, Herschbach, & Henrich, 2007). To improve the health-related quality of life of adolescents in RYC, and in general, it is important to understand the factors contributing to the functional disability (Kashikar-Zuck, Goldschneider, Powers, Vaught, & Hershey, 2001). The factors leading to, and maintaining,

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

chronic pain, mental illness and lower self-perceived HRQOL is a complex interplay, and to acquire an understanding of all these factors are beyond the scope of this paper. However, some factors stand out as more prominent.

In a study of adults in the Norwegian general population (Wahl et al., 2009), there was no direct relationship between chronic pain and HRQOL. Stress-related symptoms, such as sleep problems, nightmares, body tension, fluctuations in mood, depression, feelings of guilt and fear, was found as the strongest mediator between chronic pain and HRQOL. The RYC population is a group with higher risk of negative life-experiences (McMillen et al., 2005; Simms et al., 2000). Exposure to maltreatment was reported by 71% in an article (Greger et al., 2015) based on the same sample as the present study. A study showed that there is a modest relationship between Life Events and HRQOL, especially when the degree of Life Events reaches a considerable size (Villalonga-Olives et al., 2010). Research implies a dose response relationship between exposure of abuse or household dysfunction and impaired physical health (Felitti et al., 1998), as well as between maltreatment and psychiatric disorders (Greger et al., 2015). Negative life experiences thus have the potential of profound impact on the developing child and adolescent. In the present study, there were no difference between HRQOL in the adolescents with chronic pain and adolescents with a psychiatric disorder. Perhaps is not the type of condition the most relevant to the levels of HRQOL in this population, but rather the impact of the combination of mental and/or physical illness, and the effects of negative life-experiences and stress-related symptoms.

Through childhood and adolescence there are different important developmental tasks, such as acquirement of social competence, self-regulation, a stable identity, and autonomy (Huston & Ripke, 2006). Considerable stress can impede this acquirement (Pynoos, Steinberg, & Piacentini, 1999). As both cognitive and emotional factors have great influence on pain perceptions (Bushnell et al., 2013), underdevelopment of such domains is likely to

play a role in maladjustment and chronic pain. Self-regulation is the capacity to exert control over cognition, emotion, behavior, and physiology (Solberg Nes, Roach, & Segerstrom, 2009). Self-regulation involves cognitive regulation, emotional and social regulation, and behavioral regulation, and is a necessity in most aspects of life, but perhaps particularly important in exposure of chronic pain (Solberg Nes et al., 2009). The ability to understand and regulate emotions, forming and maintaining social relationships, control of worry and rumination, and problem-solving (e.g. passive vs. active coping) are among the important self-regulatory skills involved in chronic pain (Solberg Nes et al., 2009). As adolescence is a developmental phase where orientations towards friends, autonomy and a stable identity formation are important tasks; inability to form and/or maintain positive peer relationships might be contributing to feelings of isolation and poor psychological functioning (Platt, Cohen Kadosh, & Lau, 2013). Helseth and Misvaer (2010) identified a positive self-image, good family relations, and good friends as important factors to adolescent's HRQOL. Adolescents in RYC have a higher risk of relationship losses (McMillen et al., 2005). Adolescents in the Norwegian RYC population rate their relationship to friends worse than adolescents in the general population (Jozefiak & Sønnichsen Kaye, 2015). This may be due to break up of existing relationships caused by the placement in RYC (Jozefiak & Sønnichsen Kaye, 2015), but may also be an effect of poor social competence. They also report their self-esteem as poorer than adolescents in the general population (Jozefiak & Sønnichsen Kaye, 2015). Because they are placed in RYC, one can also assume that the family relations to a certain degree are impaired. Thus, the factors important to adolescence HRQOL are in general all impaired in adolescents in RYC.

Strengths and limitations

This study had several strengths. The sample was relatively large, providing representative data for the national RYC population. Also, the diagnosing of psychiatric

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

disorders was set in accordance with DSM-IV by trained research assistants. This study thereby avoided the limitations associated with self-report measures commonly used in research of mental health in children and adolescents. Therefore the psychiatric diagnoses in this study can be viewed as highly valid, and thereby increasing the practical usefulness of the results.

There were some limitations of this study that need to be taken into account. The measures of chronic pain were based on single variables in the CAPA, a module that is not standardized. There is generally a limitation in the pain literature regarding difficulties with comparing results due to the use of different methods and definitions of chronic pain. However, this study defines having chronic pain in line with the definition of The International Association for the Study of Pain. As this study was a cross-sectional design, retrospective self-report for the last three months was used to measure chronic pain. It is therefore a possibility of over- or underestimation of pain due to recall bias. In addition, there has not been a separation of chronic pain with identifiable cause from chronic pain without an identifiable cause, and thus making the interpretation limited to some degree. Only $\frac{3}{4}$ of the adolescents in the population completed the KINDL-R. However, the 300 completers were still representative, as the attrition did not impact sex, age or internalizing or externalizing mental health problems of the completers (Jozefiak & Sønnichsen Kayed, 2015). It is also a limitation that it was not performed an analysis of the specific dimensions of the KINDL, and thus the specific HRQOL impairments across the variables chronic pain and psychiatric disorders were not assessed. Because the study did not include a control group, the results were discussed in relation to the literature on the subject of study. Future studies should go into more depth regarding the more specific HRQOL dimensions, comparing adolescents with chronic pain and psychiatric disorders, both in this population, the CAMHS and the general population.

Conclusions

In this study, over four out of 10 adolescents in the total sample and almost six out of 10 adolescents with a psychiatric disorder reported chronic pain. Further, this association was both sex- and diagnosis dependent. Girls reported a significantly higher frequency of chronic pain. Depressive disorders were associated with chronic pain in both girls and boys, but anxiety disorders were only associated with chronic pain in girls. In addition, both chronic pain and psychiatric disorders have a significant impact on the experienced HRQOL, but the HRQOL was particularly reduced in adolescents with both chronic pain and mental illness. This study did not find any significant effect of neither age nor placement status on the frequency of chronic pain. Measurements of chronic pain or diagnosis of psychiatric disorders capture valuable information about the individual's functioning, but are limited to the presence or absence of mental or physical illness. As an outcome measure, HRQOL have the impact of capturing a qualitatively more functional measure of the general well-being of the individual.

Overall, the results of this study imply that a substantial number of adolescents in the RYC have chronic pain and mental illness, which affects their everyday living. The relationships between poor HRQOL, and chronic pain and/or psychiatric disorders are likely a result of complex interaction effects. The RYC sample is a non-clinical sample, and therefore the prevalence of psychiatric disorders and chronic pain, and the levels of HRQOL in this high-risk population are alarming. Physical and mental health issues have profound costs, not only on the socio-economic level, but also at the personal level. In many cases, adolescence mental and physical illness branches into adulthood. Considering the health status of the adolescents in RYC as shown by this study and other studies of this population, this brings forward a need to handle health factors and resilience with greater attention.

References

- Achenbach, T. M., & Rescorla, L. (2001). *ASEBA school-age forms & profiles*: Aseba Burlington.
- Angold, A., & Costello, E. J. (2000). The Child and Adolescent Psychiatric Assessment (CAPA). *J Am Acad Child Adolesc Psychiatry*, 39(1), 39-48. doi:10.1097/00004583-200001000-00015
- Arruda, M. A., Guidetti, V., Galli, F., Albuquerque, R. C., & Bigal, M. E. (2010). Migraine, tension-type headache, and attention-deficit/hyperactivity disorder in childhood: a population-based study. *Postgraduate medicine*, 122(5), 18-26.
- Asmundson, G. J., Coons, M. J., Taylor, S., & Katz, J. (2002). PTSD and the experience of pain: research and clinical implications of shared vulnerability and mutual maintenance models. *Can J Psychiatry*, 47(10), 930-937.
- Asmundson, G. J., & Katz, J. (2009). Understanding the co-occurrence of anxiety disorders and chronic pain: state-of-the-art. *Depress Anxiety*, 26(10), 888-901. doi:10.1002/da.20600
- Bair, M. J., Robinson, R. L., Katon, W., & Kroenke, K. (2003). Depression and pain comorbidity: a literature review. *Arch Intern Med*, 163(20), 2433-2445. doi:10.1001/archinte.163.20.2433
- Bastiaansen, D., Koot, H., Bongers, I., Varni, J., & Verhulst, F. (2004). Measuring quality of life in children referred for psychiatric problems: Psychometric properties of the PedsQLTM 4.0 generic core scales. *Qual of Life Res*, 13, 489 - 495.
- Bisegger, C., Cloetta, B., von Rueden, U., Abel, T., & Ravens-Sieberer, U. (2005). Health-related quality of life: gender differences in childhood and adolescence. *Soz Praventivmed*, 50(5), 281-291.

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

- Boey, C. C.-M., & Goh, K.-L. (2002). Psychosocial factors and childhood recurrent abdominal pain. *Journal of Gastroenterology and Hepatology*, *17*(12), 1250-1253. doi:10.1046/j.1440-1746.2002.02884.x
- Boyer, M. C., Compas, B. E., Stanger, C., Colletti, R. B., Konik, B. S., Morrow, S. B., & Thomsen, A. H. (2006). Attentional biases to pain and social threat in children with recurrent abdominal pain. *J Pediatr Psychol*, *31*(2), 209-220. doi:10.1093/jpepsy/jsj015
- Brattberg, G. (2004). Do pain problems in young school children persist into early adulthood? A 13-year follow-up. *Eur J Pain*, *8*(3), 187-199. doi:10.1016/j.ejpain.2003.08.001
- Bullinger, M., Bruett, A., Erhart, M., & Ravens-Sieberer, U. (2008). Psychometric properties of the KINDL-R questionnaire: results of the BELLA study. *European Child & Adolescent Psychiatry*, *17*(1), 125-132. doi:10.1007/s00787-008-1014-z
- Bushnell, M. C., Ceko, M., & Low, L. A. (2013). Cognitive and emotional control of pain and its disruption in chronic pain. *Nat Rev Neurosci*, *14*(7), 502-511. doi:10.1038/nrn3516
- Campo, J. V., Bridge, J., Ehmann, M., Altman, S., Lucas, A., Birmaher, B., . . . Brent, D. A. (2004). Recurrent abdominal pain, anxiety, and depression in primary care. *Pediatrics*, *113*(4), 817-824. Retrieved from <http://pediatrics.aappublications.org/content/113/4/817.full.pdf>
- Carbone, J. A., Sawyer, M. G., Searle, A. K., & Robinson, P. J. (2007). The health-related quality of life of children and adolescents in home-based foster care. *Qual Life Res*, *16*(7), 1157-1166. doi:10.1007/s11136-007-9227-z
- Carroll, D., Duffy, T., & Martin, C. R. (2014). A comparison of the quality of life of vulnerable young males with severe emotional and behaviour difficulties in a residential setting and young males in mainstream schooling. *J Psychiatr Ment Health Nurs*, *21*(1), 23-30. doi:10.1111/jpm.12042

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

- Chopra, K., & Arora, V. (2013). An intricate relationship between pain and depression: clinical correlates, coactivation factors and therapeutic targets. *Expert Opinion on Therapeutic Targets*, *18*(2), 159-176. doi:10.1517/14728222.2014.855720
- Costello, E. J., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence and development of psychiatric disorders in childhood and adolescence. *Arch Gen Psychiatry*, *60*(8), 837-844. doi:10.1001/archpsyc.60.8.837
- Damnjanovic, M., Lakic, A., Stevanovic, D., Jovanovic, A., Jancic, J., Jovanovic, M., & Lepasovic, L. (2012). Self-assessment of the quality of life of children and adolescents in the child welfare system of Serbia. *Vojnosanit Pregl*, *69*(6), 469-474.
- Dube, S. R., Felitti, V. J., Dong, M., Giles, W. H., & Anda, R. F. (2003). The impact of adverse childhood experiences on health problems: evidence from four birth cohorts dating back to 1900. *Preventive medicine*, *37*(3), 268-277. Retrieved from http://ac.els-cdn.com/S0091743503001233/1-s2.0-S0091743503001233-main.pdf?_tid=a68cb0c8-4401-11e4-8cd6-00000aacb361&acdnat=1411573640_889abbdc2548ffc5c0ccb24c6081892a
- Egelund, T., & Lausten, M. (2009). Prevalence of mental health problems among children placed in out-of-home care in Denmark. *Child & Family Social Work*, *14*(2), 156-165. doi:10.1111/j.1365-2206.2009.00620.x
- Egger, H. L., Costello, E. J., Erkanli, A., & Angold, A. (1999). Somatic complaints and psychopathology in children and adolescents: stomach aches, musculoskeletal pains, and headaches. *J Am Acad Child Adolesc Psychiatry*, *38*(7), 852-860. doi:10.1097/00004583-199907000-00015
- El-Metwally, A., Salminen, J. J., Auvinen, A., Kautiainen, H., & Mikkelsen, M. (2004). Prognosis of non-specific musculoskeletal pain in preadolescents: a prospective 4-year

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

follow-up study till adolescence. *Pain*, *110*(3), 550-559.

doi:10.1016/j.pain.2004.03.021

El-Metwally, A., Salminen, J. J., Auvinen, A., Kautiainen, H., & Mikkelsen, M. (2005).

Lower limb pain in a preadolescent population: prognosis and risk factors for chronicity--a prospective 1- and 4-year follow-up study. *Pediatrics*, *116*(3), 673-681.

doi:10.1542/peds.2004-1758

Farruggia, S. P., & Sorkin, D. H. (2009). Health risks for older US adolescents in foster care:

The significance of important others' health behaviours on youths' health and health behaviours. *Child: Care, Health and Development*, *35*(3), 340-348.

doi:10.1111/j.1365-2214.2009.00960.x

Fearon, P., & Hotopf, M. (2001). Relation between headache in childhood and physical and psychiatric symptoms in adulthood: national birth cohort study. *Bmj*, *322*(7295), 1145.

Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC31590/pdf/1145.pdf>

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . .

Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *Am J Prev Med*, *14*(4), 245-258.

Fillingim, R. B., King, C. D., Ribeiro-Dasilva, M. C., Rahim-Williams, B., & Riley, J. L.

(2009). Sex, gender, and pain: a review of recent clinical and experimental findings. *J*

Pain, *10*(5), 447-485. doi:10.1016/j.jpain.2008.12.001

Frisen, A. (2007). Measuring health-related quality of life in adolescence. *Acta Paediatr*,

96(7), 963-968. doi:10.1111/j.1651-2227.2007.00333.x

Garber, J., Walker, L. S., & Zeman, J. (1991). Somatization symptoms in a community

sample of children and adolescents: further validation of the Children's Somatization

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

Inventory. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*, 3(4), 588.

Garland, E. L. (2012). Pain processing in the human nervous system: a selective review of nociceptive and biobehavioral pathways. *Prim Care*, 39(3), 561-571.

doi:10.1016/j.pop.2012.06.013

Gatchel, R. J., Peng, Y. B., Peters, M. L., Fuchs, P. N., & Turk, D. C. (2007). The biopsychosocial approach to chronic pain: Scientific advances and future directions. *Psychological bulletin*, 133(4), 581-624. doi:10.1037/0033-2909.133.4.581

Gold, J. I., Yetwin, A. K., Mahrer, N. E., Carson, M. C., Griffin, A. T., Palmer, S. N., & Joseph, M. H. (2009). Pediatric chronic pain and health-related quality of life. *J Pediatr Nurs*, 24(2), 141-150. doi:10.1016/j.pedn.2008.07.003

Goldbeck, L., Schmitz, T. G., Besier, T., Herschbach, P., & Henrich, G. (2007). Life satisfaction decreases during adolescence. *Qual Life Res*, 16(6), 969-979.

doi:10.1007/s11136-007-9205-5

Greger, H. K., Myhre, A. K., Lydersen, S., & Jozefiak, T. (2015). Previous maltreatment and present mental health in a high-risk adolescent population. *Child Abuse Negl*, 45, 122-134. doi:10.1016/j.chiabu.2015.05.003

Halfon, N., Mendonca, A., & Berkowitz, G. (1995). Health status of children in foster care. The experience of the Center for the Vulnerable Child. *Arch Pediatr Adolesc Med*, 149(4), 386-392. Retrieved from

<http://archpedi.jamanetwork.com/article.aspx?articleid=517521>

Haugland, S., Wold, B., Stevenson, J., Aaroe, L. E., & Woynarowska, B. (2001). Subjective health complaints in adolescence. A cross-national comparison of prevalence and dimensionality. *Eur J Public Health*, 11(1), 4-10.

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

- Helseth, S., & Misvaer, N. (2010). Adolescents' perceptions of quality of life: what it is and what matters. *J Clin Nurs*, *19*(9-10), 1454-1461. doi:10.1111/j.1365-2702.2009.03069.x
- Holmberg, K., & Hjern, A. (2006). Health complaints in children with attention-deficit/hyperactivity disorder. *Acta Paediatrica*, *95*(6), 664-670. doi:10.1111/j.1651-2227.2006.tb02313.x
- Hotopf, M., Carr, S., Mayou, R., Wadsworth, M., & Wessely, S. (1998). Why do children have chronic abdominal pain, and what happens to them when they grow up? Population based cohort study. *Bmj*, *316*(7139), 1196-1200. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC28520/pdf/1196.pdf>
- Hunfeld, J. A., Perquin, C. W., Duivenvoorden, H. J., Hazebroek-Kampschreur, A. A., Passchier, J., van Suijlekom-Smit, L. W., & van der Wouden, J. C. (2001). Chronic pain and its impact on quality of life in adolescents and their families. *J Pediatr Psychol*, *26*(3), 145-153. Retrieved from <http://jpepsy.oxfordjournals.org/content/26/3/145.full.pdf>
- Huston, A. C., & Ripke, M. N. (2006). *Developmental contexts in middle childhood: Bridges to adolescence and adulthood*. Cambridge: Cambridge University Press.
- Jee, S. H., Barth, R. P., Szilagyi, M. A., Szilagyi, P. G., Aida, M., & Davis, M. M. (2006). Factors associated with chronic conditions among children in foster care. *J Health Care Poor Underserved*, *17*(2), 328-341. doi:10.1353/hpu.2006.0062
- Jones, G. T., & Macfarlane, G. J. (2009). Predicting persistent low back pain in schoolchildren: a prospective cohort study. *Arthritis Rheum*, *61*(10), 1359-1366. doi:10.1002/art.24696

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

- Jozefiak, T., Kayed, N. S., Rimehaug, T., Wormdal, A. K., Brubakk, A. M., & Wichstrom, L. (2015). Prevalence and comorbidity of mental disorders among adolescents living in residential youth care. *Eur Child Adolesc Psychiatry*. doi:10.1007/s00787-015-0700-x
- Jozefiak, T., Larsson, B., Wichstrom, L., Wallander, J., & Mattejat, F. (2010). Quality of Life as reported by children and parents: a comparison between students and child psychiatric outpatients. *Health and Quality of Life Outcomes*, 8(1), 136. Retrieved from <http://www.hqlo.com/content/8/1/136>
<http://www.hqlo.com/content/pdf/1477-7525-8-136.pdf>
- Jozefiak, T., & Sønnichsen Kayed, N. (2015). Self- and proxy reports of quality of life among adolescents living in residential youth care compared to adolescents in the general population and mental health services. *Health Qual Life Outcomes*, 13(1), 104. doi:10.1186/s12955-015-0280-y
- Jud, A., Landolt, M. A., Tatalias, A., Lach, L. M., & Lips, U. (2013). Health-related quality of life in the aftermath of child maltreatment: Follow-up study of a hospital sample. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation*, 22(6), 1361-1369. doi:10.1007/s11136-012-0262-z
- Kashikar-Zuck, S., Goldschneider, K. R., Powers, S. W., Vaught, M. H., & Hershey, A. D. (2001). Depression and functional disability in chronic pediatric pain. *Clin J Pain*, 17(4), 341-349. Retrieved from <http://graphics.tx.ovid.com/ovftpdfs/FPDDNCLBLHMEHI00/fs001/ovft/live/gv002/0002508/00002508-200112000-00009.pdf>
- Keefe, F. J., Lumley, M., Anderson, T., Lynch, T., & Carson, K. L. (2001). Pain and emotion: New research directions. *Journal of Clinical Psychology*, 57(4), 587-607. doi:10.1002/jclp.1030

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

- Keyes, K. M., Eaton, N. R., Krueger, R. F., McLaughlin, K. A., Wall, M. M., Grant, B. F., & Hasin, D. S. (2012). Childhood maltreatment and the structure of common psychiatric disorders. *Br J Psychiatry*, *200*(2), 107-115. doi:10.1192/bjp.bp.111.093062
- King, S., Chambers, C. T., Huguet, A., MacNevin, R. C., McGrath, P. J., Parker, L., & MacDonald, A. J. (2011). The epidemiology of chronic pain in children and adolescents revisited: a systematic review. *Pain*, *152*(12), 2729-2738. doi:10.1016/j.pain.2011.07.016
- Knook, L. M. E., Konijnenberg, A. Y., van der Hoeven, J., Kimpen, J. L. L., Buitelaar, J. K., van Engeland, H., & de Graeff-Meeder, E. R. (2011). Psychiatric disorders in children and adolescents presenting with unexplained chronic pain: what is the prevalence and clinical relevancy? *European Child & Adolescent Psychiatry*, *20*(1), 39-48. doi:10.1007/s00787-010-0146-0
- Knook, L. M. E., Lijmer, J. G., Konijnenberg, A. Y., Taminiu, B., & van Engeland, H. (2012). The course of chronic pain with and without psychiatric disorders: a 6-year follow-up study from childhood to adolescence and young adulthood. *J Clin Psychiatry*, *73*(1), e134-139. doi:10.4088/JCP.10m06751
- Lamers-Winkelmann, F., De Schipper, J. C., & Oosterman, M. (2012). Children's physical health complaints after exposure to intimate partner violence. *British Journal of Health Psychology*, *17*, 771-784. doi:10.1111/j.2044-8287.2012.02072.x
- Larsson, B., & Sund, A. M. (2007). Emotional/behavioural, social correlates and one-year predictors of frequent pains among early adolescents: Influences of pain characteristics. *European Journal of Pain*, *11*(1), 57-57. doi:10.1016/j.ejpain.2005.12.014
- Leslie, L. K., Gordon, J. N., Meneken, L., Premji, K., Michelmore, K. L., & Ganger, W. (2005). The physical, developmental, and mental health needs of young children in

child welfare by initial placement type. *J Dev Behav Pediatr*, 26(3), 177-185.

Retrieved from

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1550710/pdf/nihms11305.pdf>

Lewandowski, A. S., Palermo, T. M., Stinson, J., Handley, S., & Chambers, C. T. (2010).

Systematic review of family functioning in families of children and adolescents with chronic pain. *J Pain*, 11(11), 1027-1038. doi:10.1016/j.jpain.2010.04.005

Luntamo, T., Sourander, A., Rihko, M., Aromaa, M., Helenius, H., Koskelainen, M., &

McGrath, P. J. (2012). Psychosocial determinants of headache, abdominal pain, and sleep problems in a community sample of Finnish adolescents. *Eur Child Adolesc Psychiatry*, 21(6), 301-313. doi:10.1007/s00787-012-0261-1

Mangerud, W. L., Bjerkeset, O., Lydersen, S., & Indredavik, M. S. (2013). Chronic pain and pain-related disability across psychiatric disorders in a clinical adolescent sample.

BMC Psychiatry, 13. doi:10.1186/1471-244X-13-272

Mazefsky, C. A., Kao, J., & Oswald, D. P. (2011). Preliminary evidence suggesting caution in the use of psychiatric self-report measures with adolescents with high-functioning autism spectrum disorders. *Research in Autism Spectrum Disorders*, 5(1), 164-174.

doi:<http://dx.doi.org/10.1016/j.rasd.2010.03.006>

McMillen, J. C., Zima, B. T., Scott, L. D., Jr., Auslander, W. F., Munson, M. R., Ollie, M. T., & Spitznagel, E. L. (2005). Prevalence of psychiatric disorders among older youths in the foster care system. *J Am Acad Child Adolesc Psychiatry*, 44(1), 88-95.

doi:10.1097/01.chi.0000145806.24274.d2

McWilliams, L. A., Goodwin, R. D., & Cox, B. J. (2004). Depression and anxiety associated with three pain conditions: results from a nationally representative sample. *Pain*, 111(1), 77-83.

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

- Melzack, R. (2001). Pain and the neuromatrix in the brain. *J Dent Educ*, 65(12), 1378-1382.
Retrieved from <http://www.jdentaled.org/content/65/12/1378.full.pdf>
- Merskey, H., & Bogduk, N. (Eds.). (1994). *International Association for the Study of Pain. Task Force on Taxonomy. Classification of chronic pain: descriptions of chronic pain syndromes and definitions of pain terms.* (2. ed.). Seattle: IASP Press.
- Mulvaney, S., Lambert, E. W., Garber, J., & Walker, L. S. (2006). Trajectories of symptoms and impairment for pediatric patients with functional abdominal pain: a 5-year longitudinal study. *J Am Acad Child Adolesc Psychiatry*, 45(6), 737-744.
doi:10.1097/10.chi.0000214192.57993.06
- Mykletun, A., Knudsen, A. K., & Mathiesen, K. S. (2009). *Psykiske lidelser i norge: Et folkehelseperspektiv. [Mental disorders in norway: a public health perspective].* (2009:8). Oslo: Norwegian Institute of Public Health.
- Myrtveit, S. M., Sivertsen, B., Skogen, J. C., Frostholm, L., Stormark, K. M., & Hysing, M. (2014). Adolescent neck and shoulder pain—The association with depression, physical activity, screen-based activities, and use of health care services. *Journal of Adolescent Health*, 55(3), 366-372. doi:10.1016/j.jadohealth.2014.02.016
- Nelson, T. D., Smith, T. R., Thompson, R. W., Epstein, M. H., Griffith, A. K., Hurley, K. D., & Tonniges, T. F. (2011). Prevalence of Physical Health Problems Among Youth Entering Residential Treatment. *Pediatrics*, 128(5), E1226-E1232.
doi:10.1542/peds.2010-3609
- Nicolson, S. E., Caplan, J. P., Williams, D. E., & Stern, T. A. (2009). Comorbid pain, depression, and anxiety: multifaceted pathology allows for multifaceted treatment. *Harv Rev Psychiatry*, 17(6), 407-420. doi:10.3109/10673220903463226
- Norwegian Institute of Public Health. (2011). Chronic pain prevalence in Norway – fact sheet.
Retrieved from

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

http://www.fhi.no/eway/default.aspx?pid=240&trg=MainContent_6894&Main_6664=6894:0:25,7583:1:0:0:::0:0&MainContent_6894=6706:0:25,7590:1:0:0:::0:0

- Ojala, T., Häkkinen, A., Karppinen, J., Sipilä, K., Suutama, T., & Piirainen, A. (2014). Although unseen, chronic pain is real—A phenomenological study. *Scandinavian Journal of Pain, 6*, 33-40. doi:10.1016/j.sjpain.2014.04.004
- Owens, J. S., Goldfine, M. E., Evangelista, N. M., Hoza, B., & Kaiser, N. M. (2007). A critical review of self-perceptions and the positive illusory bias in children with ADHD. *Clin Child Fam Psychol Rev, 10*(4), 335-351. doi:10.1007/s10567-007-0027-3
- Perquin, C. W., Hazebroek-Kampschreur, A. A., Hunfeld, J. A., Bohnen, A. M., van Suijlekom-Smit, L. W., Passchier, J., & van der Wouden, J. C. (2000). Pain in children and adolescents: a common experience. *Pain, 87*(1), 51-58. Retrieved from http://ac.els-cdn.com/S0304395900002694/1-s2.0-S0304395900002694-main.pdf?_tid=4c1d15be-8f6a-11e5-aa87-00000aab0f01&acdnat=1448012421_ece51ab1110cb3f147e4b538407787d8
- Perquin, C. W., Hunfeld, J. A., Hazebroek-Kampschreur, A. A., van Suijlekom-Smit, L. W., Passchier, J., Koes, B. W., & van der Wouden, J. C. (2003). The natural course of chronic benign pain in childhood and adolescence: a two-year population-based follow-up study. *Eur J Pain, 7*(6), 551-559. doi:10.1016/s1090-3801(03)00060-0
- Platt, B., Cohen Kadosh, K., & Lau, J. Y. (2013). The role of peer rejection in adolescent depression. *Depress Anxiety, 30*(9), 809-821. doi:10.1002/da.22120
- Powers, S. W., Gilman, D. K., & Hershey, A. D. (2006). Headache and Psychological Functioning in Children and Adolescents. *Headache: The Journal of Head and Face Pain, 46*(9), 1404-1415. doi:10.1111/j.1526-4610.2006.00583.x

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

- Pynoos, R. S., Steinberg, A. M., & Piacentini, J. C. (1999). A developmental psychopathology model of childhood traumatic stress and intersection with anxiety disorders. *Biological psychiatry*, *46*(11), 1542-1554. Retrieved from http://ac.els-cdn.com/S0006322399002620/1-s2.0-S0006322399002620-main.pdf?_tid=46bade2c-99aa-11e5-b3a0-00000aacb35f&acdnat=1449139411_e00fae254d0cc4a70435dc95f4ca7a44
- Ravens-Sieberer, U., & Bullinger, M. (2000). Manual for the KINDL-R Questionnaire for measuring health-related Quality of Life in children and adolescents - Revised Version. Retrieved from <http://www.kindl.org/daten/pdf/ManEnglish.pdf>
- Ravens-Sieberer, U., Wille, N., Erhart, M., Bettge, S., Wittchen, H.-U., Rothenberger, A., . . . Döpfner, M. (2008). Prevalence of mental health problems among children and adolescents in Germany: results of the BELLA study within the National Health Interview and Examination Survey. *European Child & Adolescent Psychiatry*, *17*(1), 22-33. doi:10.1007/s00787-008-1003-2
- Ryee, M.-Y. (2011). Psychiatric Considerations in Pediatric Chronic Pain. In D. E. Nampiaparampil & B. C. McClain (Eds.), *Handbook of Pediatric Chronic Pain: Current Science and Integrative Practice* (pp. 87-94). New York: Springer.
- Sawyer, M. G., Whaites, L., Rey, J. M., Hazell, P. L., Graetz, B. W., & Baghurst, P. (2002). Health-related quality of life of children and adolescents with mental disorders. *J Am Acad Child Adolesc Psychiatry*, *41*(5), 530-537. doi:10.1097/00004583-200205000-00010
- Schmid, M., Goldbeck, L., Nuetzel, J., & Fegert, J. M. (2008). Prevalence of mental disorders among adolescents in German youth welfare institutions. *Child and Adolescent Psychiatry and Mental Health*, *2*. doi:10.1186/1753-2000-2-2

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

- Seiler, A., Kohler, S., Ruf-Leuschner, M., & Landolt, M. A. (2015). Adverse Childhood Experiences, Mental Health, and Quality of Life of Chilean Girls Placed in Foster Care: An Exploratory Study. *Psychological Trauma: Theory, Research, Practice, and Policy*, No Pagination Specified. doi:10.1037/tra0000037
- Simms, M. D., Dubowitz, H., & Szilagyi, M. A. (2000). Health care needs of children in the foster care system. *Pediatrics*, *106*(4), 909-918.
- Skrove, M., Romundstad, P., & Indredavik, M. S. (2015). Chronic multisite pain in adolescent girls and boys with emotional and behavioral problems: the Young-HUNT study. *Eur Child Adolesc Psychiatry*, *24*(5), 503-515. doi:10.1007/s00787-014-0601-4
- Solberg Nes, L., Roach, A., & Segerstrom, S. (2009). Executive Functions, Self-Regulation, and Chronic Pain: A Review. *Annals of Behavioral Medicine*, *37*(2), 173-183. doi:10.1007/s12160-009-9096-5
- Stanford, E. A., Chambers, C. T., Biesanz, J. C., & Chen, E. (2008). The frequency, trajectories and predictors of adolescent recurrent pain: a population-based approach. *Pain*, *138*(1), 11-21. doi:10.1016/j.pain.2007.10.032
- Subramaniam, M., Vaingankar, J. A., Abdin, E., & Chong, S. A. (2013). Psychiatric morbidity in pain conditions: results from the Singapore Mental Health Study. *Pain Res Manag*, *18*(4), 185-190. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3812189/pdf/prm18185.pdf>
- Swanson, E. N., Owens, E. B., & Hinshaw, S. P. (2012). Is the positive illusory bias illusory? Examining discrepant self-perceptions of competence in girls with ADHD. *J Abnorm Child Psychol*, *40*(6), 987-998. doi:10.1007/s10802-012-9615-x
- Sønnichsen Kayed, N., Jozefiak, T., Rimehaug, T., Tjelflaat, T., Brubakk, A., & Wichstrøm, L. (2015). Psykisk helse hos barn og unge i barneverninstitusjoner. Retrieved from https://http://www.ntnu.no/trykk/publikasjoner/Barnevernrapport_RKBU/

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

- The WHOQOL Group. (1998). The World Health Organization quality of life assessment (WHOQOL): Development and general psychometric properties. *Social science & medicine*, 46(12), 1569-1585. doi:[http://dx.doi.org/10.1016/S0277-9536\(98\)00009-4](http://dx.doi.org/10.1016/S0277-9536(98)00009-4)
- Van Damme-Ostapowicz, K., Krajewska-Kułak, E., Wrońska, I., Szczepański, M., Kułak, W., Lukaszuk, C., . . . Baranowska, A. (2007). Quality of life self-assessment of children living in a children's home, based on own research conducted in the Podlaskie Province. *Therapeutic-nursing problems since born to old age*, 52, 44.
- Varni, J., Limbers, C., & Burwinkle, T. (2007). Impaired health-related quality of life in children and adolescents with chronic conditions: a comparative analysis of 10 disease clusters and 33 disease categories/severities utilizing the PedsQLTM 4.0 Generic Core Scales. *Health Qual Life Outcomes*, 5, 43. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1964786/pdf/1477-7525-5-43.pdf>
- Vetter, T. R., Bridgewater, C. L., Ascherman, L. I., Madan-Swain, A., & McGwin, G. L., Jr. (2014). Patient versus parental perceptions about pain and disability in children and adolescents with a variety of chronic pain conditions. *Pain Res Manag*, 19(1), 7-14.
- Villalonga-Olives, E., Rojas-Farreras, S., Vilagut, G., Palacio-Vieira, J. A., Valderas Jé, M., Herdman, M., . . . Alonso, J. (2010). Impact of recent life events on the health related quality of life of adolescents and youths: the role of gender and life events typologies in a follow-up study. *Health Qual Life Outcomes*, 8, 71. doi:10.1186/1477-7525-8-71
- Wahl, A. K., Rustøen, T., Rokne, B., Lerdal, A., Knudsen, Ø., Miaskowski, C., & Moum, T. (2009). The complexity of the relationship between chronic pain and quality of life: a study of the general Norwegian population. *Qual Life Res*, 18(8), 971-980. doi:10.1007/s11136-009-9515-x
- Wiesenfeld-Hallin, Z. (2005). Sex differences in pain perception. *Gen Med*, 2(3), 137-145.

CHRONIC PAIN, PSYCHIATRIC DISORDERS, AND HRQOL

Woods, S. B., Farineau, H. M., & McWey, L. M. (2013). Physical health, mental health, and behaviour problems among early adolescents in foster care. *Child: Care, Health and Development*, 39(2), 220-227. doi:10.1111/j.1365-2214.2011.01357.x

World Health Organization. (1947). *World Health Organization Constitution*. Geneva, Switzerland: World Health Organization.