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**Multisite musculoskeletal pain, self-harm and suicidal behaviour in Northern Norwegian adolescents: a population-based study**

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## PREFACE

The aim of this study was to investigate the prevalence of pain and suicidal behaviour among adolescents in Nordland, Troms and Finnmark during the period of 2003-2005. Both pain and suicidal behaviour from a young age lead to a significant burden, both individual and societal, which may last over several years. Their prevalence and association are therefore of interest.

It was through the interest in paediatrics and pain physiology that cooperation with associate professor at Institute of Clinical Medicine, University of Tromsø, Dr. Christian Eckhoff was established, due to his dissertation on pain in adolescents. Dr. Eckhoff had an idea for a master's thesis ready and welcomed me to work with him and Dr. Joseph Judeson.

I would like to thank my fellow student Cecilie Schive for proofreading.

I would like to give a special thanks to Dr. Christian Eckhoff for his committed involvement throughout the entire thesis both in regard to content, statistics and writing process. Feedback and advice were given enthusiastically. I would also like to thank Dr. Judeson Joseph for proofreading this thesis.

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Hanna Marie Owren Claussen

## ABSTRACT

**Title:** Multisite musculoskeletal pain, self-harm and suicidal behaviour in Northern Norwegian adolescents: a population-based survey

**Background:** Self-harm and suicidal behaviour commonly debuts and increases during adolescence. Suicidal behaviour is a major public health concern and is associated with later suicidal behaviour, mental health disorders and poor functioning in adulthood. Musculoskeletal pain also increases during adolescence and multisite pain is associated with increased disability and psychosocial problems. In this study, we investigate the association between adolescent multisite musculoskeletal pain and adolescent self-harm and suicidal behaviour (ASSB).

**Method:** The Norwegian Arctic Adolescent Health Study was conducted among 10<sup>th</sup> graders (15-16-year olds) in the two northernmost counties in Norway during 2003-2005. The questionnaire was carried out in classroom settings. Univariate analyses were carried out using Chi-square tests. Logistic regression was used for the multivariable analyses examining the relationship between multisite musculoskeletal pain and ASSB.

**Results:** A positive association was found between an increase in the number of musculoskeletal pain sites and increased suicidal intent in the dimensional range of ASSB. The association was statistically significant among adolescents reporting both suicidal ideation and self-harm after adjusting for adolescent psychosocial problems. Female adolescents reported musculoskeletal pain and ASSB to a greater extent compared to male adolescents. More male adolescents reported self-harm without suicidal ideation than female adolescents.

**Conclusions:** The study shows that multisite musculoskeletal pain is associated with an increased suicidal intent among adolescents. Physicians should be aware of this association in order to assess and prevent suicide among adolescents with multisite musculoskeletal pain. Furthermore, awareness regarding presentation of multisite musculoskeletal pain among adolescents with anxiety and depression is warranted. Further investigations on preventative measures regarding multisite pain and ASSB particularly in female adolescents are needed.

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# 1 INTRODUCTION

## 1.1 SELF-HARM AND SUICIDAL BEHAVIOUR EPIDEMIOLOGY

Death by suicide is the third leading cause of death among 15-19 year olds(1). The World Health Organization (WHO) call it a major public health problem and it leads to “economic, social and psychological burdens for individuals and families” (2). Studies report one completed suicide per 40-100 attempted suicide in youth (3,4). In 2017, Centers for Disease Control and Prevention, CDC, reported that the US rates of suicide ideation among adolescents were 17%, 13.6% of planning suicide and 7.4% of attempted suicide(5). Suicidal behaviour is the result of a complex relationship between factors such as psychosocial, physical and cultural aspects as well as genetics, personality, and negative life events (6–9). The prevalence of suicide ideation and attempts increases from the age of 15 up to 25 years (10,11) most adolescents who die from suicide live in low- and middle-income countries (12).

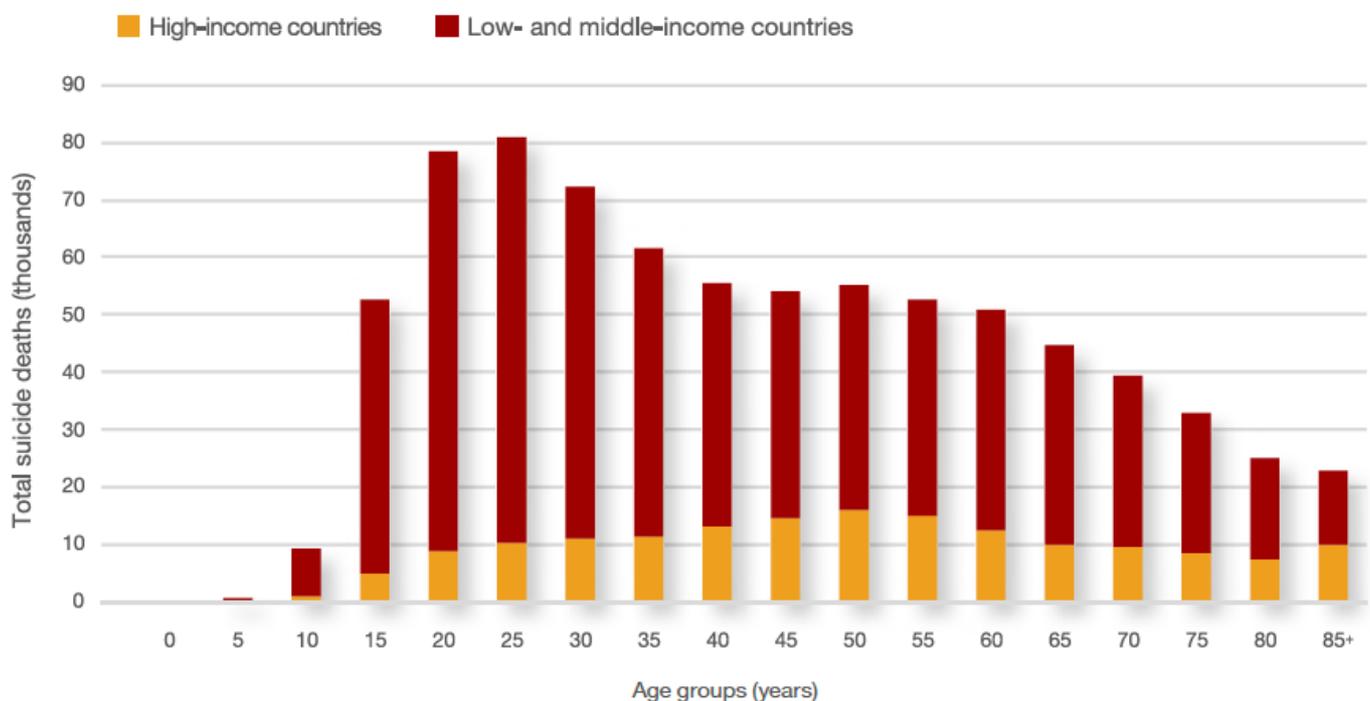


Figure I: Global suicides, by age and country income level\* (thousands), 2016. Source: *Suicide in the world: Global Health Estimates, 2019* (12). \* World Bank income groups.

## 1.2 PAIN IN ADOLESCENTS

Pain is a common complaint among adolescents (13–15). Musculoskeletal pain is the most commonly reported pain within adolescents (13,14) and the prevalence varies between 9% to 40% depending on the type of study (13,16). Besides musculoskeletal pain, head- and abdominal pain are most frequently reported by adolescents (13,14). The high prevalence of somatic complaints in adolescents has been associated with psychosocial problems (17,18) or as a way of presenting mental health disorders (19). During the last decade there has been an increased focus on the high prevalence of multisite musculoskeletal pain rather than that of single site pain among adolescents. In general, multisite pain is more often reported among girls and in older adolescents (13,14,20). Multisite pain is related to increased disability and psychiatric symptoms (21), psychosocial problems such as difficulty in the relationship to peers (22) as well as pain persistence which seems to increase with psychological stress and the number of pain sites (23).

Among studies on adults, there is a growing agreement that chronic pain is associated with suicidal ideation (24–26) and suicide attempts (25,27). As a part of WHO's global initiative on suicide prevention, they have recommended a clinical assessment of suicidal behaviour among chronic pain patients 10 years or older (2). Research on adolescents have so far not been able to conclude on how pain and suicidality is associated. A recent systematic review found that pain in adolescents may double the risk of suicidal behaviour, but comments on great heterogeneity in between studies (28). A great variety on how pain is measured and what type of pain is reported (29) and a variety in what variables the studies control for are some of the reasons for this discrepancy (28). The same systematic review calls for investigations regarding suicidality among adolescents and different aspects of pain such as frequencies.

## 1.3 ADOLESCENT SELF-HARM AND SUICIDAL BEHAVIOUR (ASSB)

Self-harm is defined as the act of hurting one self, through poisoning or self-injury, regardless of suicidal intent (7,30). Hawton et al. reports that about 10% of adolescents self-harm (7), but only one in eight presented themselves to hospitals. Studies show that more female than male report self-harm (7,31). Self-harm among female increases from the age of 12, but from the age of 15 self-harm becomes increasingly common among male adolescents (7,30,32). Factors associated with self-harm are biological predisposing factors, types of personality such as perfectionism or impulsivity, cognitive vulnerabilities and negative life-events (8,30).

Suicidal ideation are thoughts about killing oneself, thoughts which may include a plan. Suicide attempt is the self-injurious behaviour intended to kill oneself, that is non-fatal (33). Female adolescents report more suicidal ideation and suicide attempts than male adolescents, however suicide death rates show that 2/3 of suicides victims aged 15-23 years are male (7,34). Other than gender, associated factors to suicidal ideation and attempts are similar to those of self-harm. A study by Hawton et. al. present youth-specific risk factors such as restricted educational achievement, family history of suicidal behaviour, parental separation and social contagion (7). Furthermore, studies have shown that suicidal behaviour in adolescents is associated to later suicidal behaviour, mental health disorders and long-term welfare benefit receipt, and long-term unemployment (35–37).

Previous studies have investigated the association between somatic illness and ASSB in adolescents. Epilepsy and migraine have been associated to increased self-harm hospitalisation (38) and suicidal ideation (39,40). Respiratory symptoms are associated with mental health disorders (41), but it is uncertain if other frequent somatic conditions during adolescents such as allergy, asthma and skin rashes are associated with suicidal behaviour (38). One study found that the presence of emotional distress or the co-occurrence of chronic physical illness and emotional distress increased the risk of ASSB to a greater extent than among adolescents with chronic illness alone (42).

#### 1.4 THE BIOPSYCHOSOCIAL MODEL

Pain is a normal and necessary sensation which can be a signal of damage or disease. However, pain that persists and becomes chronic can be disabling (43). Chronic and recurrent pain such as musculoskeletal pain of idiopathic origin are commonly reported by adolescents (13,44).

The biopsychosocial approach has been used by Adams and Turks (45) as a means to better understand the multiple aspects of chronic pain. This perspective examines a person's biological, psychological, social and environmental aspects in order to understand what influence, maintain and exacerbate chronic pain (45). The biological aspect entails genetics and tissue damage and other physiological aspects not to be further investigated in this thesis.

The psychological aspects of pain consist of a person's experience of pain based on its emotions and mental state, prior experiences, perceived control, catastrophic thinking or self-efficacy. Different emotions such as depression and anxiety can affect a person's perception of pain and chronic pain may have a considerable effect on a person's emotions (45).

Symptoms of depression or anxiety co-occur with pain among adolescents (17). Anxiety and depression disorders are also associated with adolescent multisite pain (46).

The social aspect of pain includes how pain influences a person's relationship with peers and family. Multisite pain in adolescents is associated with relationship problems with peers and parents (22), negative life-events and school-related stress (47).

Adolescents with chronic pain report lower quality of life compared to healthy peers. Functional impairment due to pain in adolescents has been reported (48), but prevalence varies greatly, 5-58% , between studies (21,49). The functional impairment increases in relation to intensity and frequency of pain (48).

## 1.5 EXISTING KNOWLEDGE

Most studies in adolescents have investigated the association between suicidal ideation and chronic/recurrent pain at one pain site (39,50–52) Van Tilburg and his team (50) found that chronic headache, stomach- or muscle/joint pain, in adolescence is a risk factor for suicidal ideation. However, the effect was partly explained by depression. These findings are similar to the cross-sectional study done by Koeing et al. (52).

A cohort study from Finland (53) compared self-reported headache and stomach pain of children at the age of 8, with the death registry after the children had reached 24 years. Here, they found a significant association between self-reported abdominal pain and committed suicide among boys, adjusting for family composition, parental educational level, and emotional, hyperkinetic, and conduct problems at baseline.

Two studies have found that pain was not significantly related to suicidal ideation. The case-studies of Lewcun et al. (54) of adolescents with amplified musculoskeletal pain syndrome (AMPS), a spectrum of idiopathic chronic pain disorders, such as fibromyalgia, complex regional pain syndrome (CRPS), and myofascial pain, found that duration of pain is significantly related to suicidal ideation, but the association was mediated by depression. Suicidal ideation did not vary between the groups with or without chronic pain in the case-control study by Bromberg et al. (55). To our knowledge, one other study has differentiated between number of pain sites. Halvorsen et.al. found that three to four pain sites, compared to one to two pain sites, were significantly associated with suicidal ideation after controlling for anxiety and depression (56). The lack of studies investigating multisite pain in relation to suicidal behaviour among adolescents, warrants further investigation. This study aims to contribute to the existing knowledge.

In this thesis we used data from the Norwegian Arctic Adolescent Health Study (NAAHS) a self-reported questionnaire study of 15–16-year-old adolescents conducted in northern Norway. The main objective of this thesis is to examine the association between musculoskeletal multisite pain and four different categories of suicidal behaviour; self-harm only, suicidal ideation only, suicidal ideation with self-harm and suicide attempts in adolescence. Secondly, we will explore gender differences, and thirdly we aim to examine the degree to which multisite musculoskeletal pain is associated with suicidal behaviour adjusted for several sociodemographic, physical and psychosocial factors.

## 2 METHODS

### 2.1 STUDY DESIGN

The Norwegian Arctic Adolescent Health Study (NAAHS) was conducted among 10<sup>th</sup> graders (15-16-year olds) in all junior high schools in the two northernmost counties in Norway, Nordland and Troms and Finnmark, in 2003-2005. The questionnaires were administered in classroom settings, monitored by project staff and completed during two school hours. Students who were not present in class during the questionnaire administration completed the questionnaire at a later date. The students and their parents were given written information about the study, and the students provided written consent. The data collection was conducted and funded by a joint collaboration between the Centre for Sami Health Research at the University of Tromsø and the Norwegian Institute of Public Health. The Regional Medical Ethical Committee, the Norwegian Data Inspectorate, and the school authorities approved the study.

### 2.2 SAMPLE

A total number of 4,881 out of 5,877 (RR: 83%) invited students participated, of whom 50.1% were female and 49.9% were male. In total, 10% (450 of 4449) of the sample were indigenous Sami. In the Non-Sami group 64 adolescents reported having other nationalities, the participants thus consisting mainly of majority Norwegians.

### 2.3 VARIABLES

#### 2.3.1 PHYSICAL FACTORS

*Musculoskeletal pain* was measured using “yes/no” answers to the question: “*During the last 12 months have you several times been troubled by pain in the head, neck/shoulder, arms/legs/knees, abdominal or back?*” Abdominal pain was excluded on the basis of not necessarily originating from the abdominal muscles, and the potential bias of menstrual pain in females. The four pain sites included were handled as a discrete variable ranging from 0-4 pain sites.

*Pain-related functional impairment:* Participants were asked if the pain had resulted in reduced activity during leisure time (yes/no). In the analyses for pain-related functional

impairment, those reporting functional impairment just due to abdominal pain were excluded (N=26).

*Physical activity* was measured by the question: “How many hours per week do you spend on physical activity, to an extent that make you sweat and/or out of breath”; 0, 1–2, 3–4, 5–7, 8–10, or  $\geq 11$  hours per week. Physical activity was recoded into four groups, 0 (0), 1–4 (1), 5–7 (2) and  $\geq 8$  (3) hours per week.

*Physical injury*: The participants were asked if they had experienced a serious illness or injury during the last year (yes/no) and were asked to describe their illness/injury. There were few reports of illness/injury of serious nature and the number of chronic illnesses reported was too low for statistical analysis. The number of physical injuries, mostly extremity injuries and some concussions, were 42.6% (N=136) of the total responses.

### 2.3.2 SOCIODEMOGRAPHIC FACTORS

*Parental education*: Parents’ highest education was obtained from Statistics Norway’s education registry, registered when the participants were 15–16 years old. Parental education was categorized from “lower secondary” ( $\leq 10$ th grade), “upper secondary” ( $\leq 13$ th grade), “lower university degree” (up to 5 years) to “higher university degree” (5 years or more) (57).

*Sami ethnicity* was defined by participants as having one or more of the following factors: Sami parentage or Sami language competence in parents, grandparents and the participants, or Sami self-labelling (58).

### 2.3.3 PSYCHOSOCIAL FACTORS

#### *Social network*

*Self-efficacy* ( $\alpha=0.77$ ) was measured by a five-item version of the *General perceived self-efficacy scale* (59). Responses were scored on a four-point Likert scale from “completely wrong” (1) to “completely right” (4).

*Parental involvement* was measured by a four-item version of the *Parental Involvement Scale* ( $\alpha=0.78$ ) (47,60). *Parental support* ( $\alpha=0.88$ ) was measured by five statements on family attachment, being valued and taken seriously, and receiving help when needed (47). *Peer support* ( $\alpha=0.84$ ) was measured by four statements on peer attachment and support, being valued, and receiving help when needed. *Parental involvement*, *parental* and *peer support* were scored on a four-point scale from “completely agree” (0) to “completely disagree” (3) (59).

### *Stressors/emotional distress*

*School-related stress* ( $\alpha=0.66$ ) was measured by the following four experiences: work pressure, pressure to succeed, concentration difficulties, and understanding the teacher (47). Responses were scored on a three-point scale from “no” (1) to “yes, often” (3).

*Adverse life events* such as parental drug problems, bullying and assault were measured by 12 dichotomized questions described by Eckhoff and Kvernmo (47).

*Anxiety/depression symptoms* measured by the Hopkins Symptom Checklist 10-item version (HSCL-10) (61). The HSCL-10 ( $\alpha=0.87$ ) measures symptoms in the previous week. Psychometrics has been validated among subjects aged 16–24 years (62). The HSCL-10 was handled continuously in the multivariable analyses.

### 2.3.4 ADOLESCENT SELF-HARM AND SUICIDAL BEHAVIOUR (ASSB)

The participants were asked: “Have you ever; -considered ending your own life, -attempted to take your own life, -hurt yourself on purpose.” The three questions had yes/no options. A dimensional approach to the categorization of suicidal behaviours was used(63).

*Suicidal ideation* was defined as the participants reporting suicidal ideation and no suicide attempts. Suicidal ideation was further divided into *suicidal ideation and no self-harm* and *suicidal ideation and self-harm*. *Suicide attempts* were defined as the participants reporting suicide attempts. *Self-harm* was defined as the participants ever having *self-harmed* and *self-harmed only*, with no suicidal ideation or attempts.

The questionnaire did not include questions about the debut of suicidal ideation but included questions about the debut of suicide attempts. We consider our data reliable, since the debut of suicide attempts in our sample was comparable to previous knowledge (<10 years=0.4%, 10–12 years=1.6%, 13–15 years=5.9%) (10,64).

## 2.4 DATA ANALYSIS

Pearson correlations were used to control for multicollinearity between explanatory factors by applying Cohen’s criteria. Univariate analyses were carried out using Chi-square tests. Stratified analyses by gender and anxiety/depressive symptoms were carried out in relation to the association between musculoskeletal pain and ASSB. Logistic regression was used for the multivariable analyses examining the relationship between multisite musculoskeletal pain and ASSB. The participants with no ASSB was used as reference group to which we compared adolescents with ASSB. In the multivariable analyses, we first

adjusted for sociodemographic factors, secondly for indicators of physical health, thirdly for social network factors and lastly for stressors/emotional distress.

The anxiety/depression variable was analysed as a categorical variable in the univariate analysis and as a continuous variable in all multivariable analyses. The categorical variables were coded 1 for the presence of the phenomenon and 0 for its absence and for gender, males (0) and females (1). The statistical significance level was set to .05.

### 3 RESULTS

#### 3.1 ADOLESCENT PAIN AND MULTISITE MUSCULOSKELETAL PAIN

Headache was the most commonly reported pain site; a total 50% of all participants reported to have experienced headache over the last 12 months, followed by neck and shoulder pain, back pain and arm/leg/knee pain. With the exception of arm/leg/knee pain, there was a significant gender difference with more females experiencing pain during the last 12 months (Table 1).

#### 3.2 ADOLESCENT SELF-HARM AND SUICIDAL BEHAVIOUR

In total, 9.6% of all participants reported self-harm alone, 13.7% reported suicidal ideation without self-harm, 11.5 % reported suicidal ideation and self-harm and 8.9% reported suicide attempts (Table 1). Female participants reported significantly more ASSB compared to males. 14.1% of female participants reported suicide attempts contrary to 3.5% of the male participants. Suicidal ideation both with and without self-harm was reported by approximately 16% of the female participants compared to male participants with self-harm (6.6%) and without self-harm (10.7%). Self-harm without suicidal ideation was reported at a significantly higher rate among the male participants (Table 1). All suicide attempters reported having had suicidal ideation and 87.9% reported previous self-harm (not shown in tables).

#### 3.3 ASSOCIATION BETWEEN MULTISITE PAIN AND SUICIDAL BEHAVIOUR

Table 2 shows that there were significantly higher reports of suicidal ideation without self-harm among adolescents with pain (14.4%) compared to those without pain (9.8%). Suicidal ideation with self-harm was reported significantly more by adolescents with pain (13.0%) compared to those without pain (5.6%). The same was found for suicide attempts among participants with pain compared to participants without pain (10.2% vs. 3.5%).

Among the participants who reported pain-related functional impairment, there was a higher incidence of reported ASSB compared to those who reported no pain-related functional impairment (Table 3).

Table 4 shows that multisite musculoskeletal pain was a common phenomenon with significantly increased reports among female adolescents. Furthermore, it shows the association between the number of pain sites and ASSB stratified by gender. The proportion

of ASSB increased with the number of experienced pain sites, in both genders. Self-harm among male participants was significantly associated with increased number of pain sites. Suicidal ideation without self-harm was also significantly associated with number of pain sites among the total sample. Suicidal ideation with self-harm and suicide attempts was significantly associated with increased number of pain sites in both genders. The proportion of suicidal ideation only, suicidal ideation with self-harm and suicide attempts was higher among female participants and increased at a higher rate with increasing number of pain sites compared to male participants (Table 4). 16.0% of female participants who reported four pain sites reported self-harm and suicidal ideation compared to 6.6% among the male participants. 27.9% of the female participants and 21.9% of male participants who reported four pain sites reported having attempted suicide (Table 4).

Table 5 shows the unadjusted and adjusted multivariable analyses for the association between adolescent musculoskeletal pain and ASSB. Adolescent musculoskeletal pain was positively and significantly associated with all forms of ASSB after adjusting for sociodemographic factors, physiological parameters and social network. Adolescent musculoskeletal pain was significantly associated with participants reporting suicidal ideation and self-harm also in the fully adjusted model (OR=1.29,  $p<0.001$ ) (Table 5). Being a male participant was significantly associated with self-harm in the fully adjusted model (OR=0.72,  $p=0.03$ ). Being a female participant was significantly associated with all the other forms of ASSB measured. This was also significant in the fully adjusted model.

The proportion of reported symptoms of depression/anxiety was higher among female participants; 30.6% of the females scored above 1.85 on the Hopkins scale, more than 3 times higher than male participants (7.7%) (Table 1). All forms of suicidal behaviour were reported to a greater extent by participants with depression/anxiety. The odds ratio for suicide attempts was 7 times higher for participants with symptoms of anxiety and depression than for those without (Table 5). The number of hours with physical activity was negatively and significantly associated with suicidal ideation and self-harm in the fully adjusted model. Other variables significantly associated to ASSB in the fully adjusted table were parental support, parental involvement, negative life-events, school-related stress and depression/anxiety symptoms (Table 5).

## 4 DISCUSSION

### 4.1 MAIN FINDINGS

The main finding of this study was the positive association between multisite musculoskeletal pain and increased suicidal intent in the dimensional range of ASSB. Musculoskeletal pain among adolescents was significantly associated with suicidal ideation with self-harm after adjusting for adolescent psychosocial problems. Self-harm, suicidal ideation without self-harm and suicide attempts were no longer significant after adjusting for adolescent psychosocial problems. Female adolescents reported musculoskeletal pain and all forms of ASSB except for self-harm without suicidal ideation to a greater extent than their male counterparts. Male adolescents with musculoskeletal pain reported a larger degree of self-harm without suicidal ideation than females.

### 4.2 INTERPRETATION OF FINDINGS AND COMPARISONS TO PREVIOUS STUDIES

Our findings support that multisite musculoskeletal pain is a prevalent complaint among adolescents, despite the relatively low prevalence of physical injury and illness seen in adolescence in previous studies (65,66). The prevalence of multisite musculoskeletal pain among adolescents in this study was in accordance with previous studies (13,14,67–70) Female adolescents reported more pain from all pain sites and more multisite pain. Studies have suggested differences in pubertal development, pain tolerance or coping mechanisms to be of importance for the gender difference (17,71–73). However, it is concerning how many females report multisite pain and symptoms of anxiety and depression. Similar studies have supported the association between multisite musculoskeletal pain and anxiety and depression symptoms (14,47,67,68,74–76)

All forms of ASSB were significantly more reported by adolescents with symptoms of multisite musculoskeletal pain. Of particular note was suicidal ideation (with and without self-harm), which was reported to a greater extent by adolescents with pain than what was seen in earlier community-based studies (39,51,56). This may be due to our broad definition of pain or the high prevalence of musculoskeletal pain compared to the types of pain investigated in these studies. Our findings show how an increase in the number of pain sites was associated with more reports of ASSB. Even though no particular causation can be singled out, the severity of an increased number of pain sites should not be negated by clinicians seeing adolescents.

The gender differences found in this study, that females reported a higher suicidal intent, corresponds with existing literature (7,31,77–79). These differences were partly explained by the presence of psychosocial factors, but gender was still statistically significant in the multivariable analysis, particularly for suicide attempts. However, self-harm without suicidal ideation was more common among the male participants. This differs from a range of studies where female adolescents often report more self-harm (31,78,79). Few studies have differentiated between self-harm with and without suicidal ideation, which may explain this difference. Our findings may at first indicate a lower suicidal intent among male participants. However, earlier studies have discussed that non-suicidal self-harm is associated with suicide attempt later in life (80,81) and should thus not be underestimated. In our study, female participants reported more self-harm when viewing all self-harm, both with and without suicidal ideation, as one group.

Multisite musculoskeletal pain was significantly associated with suicidal ideation with self-harm. There may be other causes of association between suicidal ideation and pain not identified in this study, however the findings suggest a trajectory between pain and suicidal behaviour not yet fully understood. A previous Norwegian study (82) suggests that an association between physical pain and suicidal ideation may continue into late adolescence, thus strengthening the importance of our findings.

Symptoms of depression and anxiety, school stress and negative life events seem to mediate the association between multisite pain and ASSB. This calls attention to the fact that ASSB is the result of a complex relationship between several factors such as genetics, personality, physical, familial and psychosocial factors (7,8). Depressive disorders are prevalent among adolescent suicide victims (82,83) Both school-related stress and negative life events are risk factors for later suicide attempts according to previous studies (11). Our findings present the co-existence of multisite musculoskeletal pain and ASSB, and how it may reflect the adolescents' psychosocial situation. This may emphasize the importance of implementing preventative measures in the community in order to find and support adolescents who have predisposing psychosocial backgrounds.

A systematic review by Europe PMC Funders Group on the pain-suicidality association discussed whether depression is a cofounder, mediator or moderator of suicidal tendencies (28). One study found that mental health disorders preceded pain among adolescents with both conditions (84), whereas other longitudinal studies found that adolescent pain was an independent predictor for later emotional distress (67). The presence of emotional distress

and mental health disorders are a known risk factor for self-harm in adolescents (38) and suicide (85) in adults. Therefore, self-harm and suicidal tendencies may occur simultaneously with pain, but independent from one another. Previous studies have shown that multisite pain and increased pain frequency is related to increased disability (86). Moreover, multisite pain is related to a higher probability of pain persistence (69). Chronic pain and increased disability in adolescents may lead to isolation, physical restrictions and impaired relationship with peers (22), which may lead to mental health deterioration, further leading to increased vulnerability to ASSB. One study investigated the leading causes of physical disability among individuals across different age groups who were living with chronic pain (87). While pain severity was the leading cause of physical disability among older adults, the most debilitating factor for adolescents experiencing chronic pain was emotional distress/catastrophizing, which led to physical disability. One can speculate whether emotional distress can lead to depression which in turn can mediate suicidal behaviour. This is supported by previous studies (58). A recent review identified poor physical health to be one of four risk factors associated with suicide following self-harm in adults. A history of previous episodes of self-harm, suicidal intent and male gender were the other risk factors identified (88). A study by Barnes et al. is also of interest where they found co-existing physical and mental health disorders was associated with 2-3 times increased risk of developing suicidal behaviour, thus implying that mental illness may act as a moderator (42).

### 4.3 STRENGTHS AND LIMITATIONS

The main strength of this study was the high number of participants and a response rate of 83%. This made it possible to separate ASSB into four dimensional groups showing the aspects of increasing suicidal intent in ASSB. Additionally, a large sample size allowed us to look at multiple pain sites. The cross-sectional design with participants from all junior-high schools in Northern Norway made this a representative population, increasing the validity of the study. It was not possible to do analysis on the non-responders, and it is possible that they represented individuals who were worse off compared to responders, which may have led to an under-reporting of pain and ASSB in this study. Another strength of this study was few missing data for each question. This indicates that the adolescents understood the questions well, which contributes to the internal validity of this study.

Limitations of this study included its cross-sectional design, meaning no causal direction of the findings can be described. The study was based on self-reported information, which may

have led to information bias. Some of the findings may be hard to replicate due to the use of scales not frequently used by other studies. However, the HSCL-10 subscale is commonly used and is a validated method for measuring symptoms of anxiety and depression (61). The questionnaire regarding pain can be criticized; adolescents were asked to report musculoskeletal pain “several times” during the last 12 months, which opened for subjective interpretation of the word “several”. However, one could expect the reported pain to be of a certain frequency and seriousness. Abdominal pain was associated with suicidal behaviour in previous studies (52,53), and excluding it may have led to loss of associations. Pain and ASSB in adolescents are complex conditions and adjusting for factors that potentially confound each other may have led to an underestimation of some associations.

The participants were asked if they had experienced a serious illness or injury during the last year (yes/no) and were asked to describe their illness/injury. A previous study by Eckhoff et al. (47) explored the prevalence of serious illness among the adolescents that were included in this study. Physical injuries such as extremity fractures and sprains were most prevalent. Only a few participants reported serious illness such as Juvenile Rheumatoid Arthritis and migraine. Too few of the participants answered the question regarding physical health for the numbers to be of significance. Therefore, excluding pain originating from chronic illness was not possible. Based on the cross-sectional design of this study, it was not possible to verify what sort of somatic illness the adolescents suffered from.

#### 4.4 CONCLUSION

This study supports the existing evidence that there is an association between pain and suicidal behaviour in adolescents. Our results show that an increase in musculoskeletal pain sites is associated with an increased suicidal intent among adolescents. Psychosocial factors mediate the association, however suicidal ideation with self-harm was significantly associated with multisite pain regardless of psychosocial factors. Hopefully the findings in this study will lead to an increased focus on suicide assessment and prevention among adolescents with multisite musculoskeletal pain. Furthermore, awareness regarding multisite musculoskeletal pain among adolescents with anxiety and depression is warranted. Further investigations on preventative measures regarding multisite pain and ASSB particularly in female adolescents is needed.

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## 6 TABLES

TABLE 1. Descriptive statistics for adolescent musculoskeletal pain, anxiety/depressive and self-harm and suicidal behaviour (ASSB) by gender (%).

	<b>Males N=2438</b>	<b>Females N=2443</b>	<b>Total N=4881</b>	<b>Gender diff. (<math>\chi^2</math>)</b>
<b>Musculoskeletal pain (%)</b>				
Headache	37.8	63.0	50.8	282.59 <sub>p&lt;0.001</sub>
Neck/shoulder pain	27.7	42.7	35.2	115.21 <sub>p&lt;0.001</sub>
Backpain	31.1	37.2	34.1	19.05 <sub>p&lt;0.001</sub>
Arm/leg/knee pain	30.7	33.2	31.9	3.337 <sub>p=0.068</sub>
<b>Anxiety/depression</b>				
	7.7	30.6	19.2	409.055 <sub>p&lt;0.001</sub>
<b>ASSB (%)</b>				
No ASSB	67.4	45.7	56.3	
Self-harm only	11.9	7.4	9.6	26.61 <sub>p&lt;0.001</sub>
Suicidal ideation	10.7	16.5	13.7	33.57 <sub>p&lt;0.001</sub>
Suicidal ideation and self-harm	6.6	16.3	11.5	107.11 <sub>p&lt;0.001</sub>
Suicide attempts	3.5	14.1	8.9	161.49 <sub>p&lt;0.001</sub>

Note: statistical analyses: Chi-square ( $\chi^2$ )

a Hopkins Symptom Checklist-10, cut-off 1.85.

TABLE 2. Self-harm and suicidal behaviour (ASSB) reported by adolescents with pain and without pain (%)

	<b>No pain</b>	<b>Musculoskeletal Pain</b>	<b>Total</b>	<b><math>\chi^2</math></b>
No ASSB	71.6%	51.4%	57.0%	171.91 <sub>p&lt;0.001</sub>
Self-harm only	8.3%	9.2%	9.0%	13.02 <sub>p&lt;0.001</sub>
Suicidal ideation without self-harm	9.8%	14.4%	13.1%	43.67 <sub>p&lt;0.001</sub>
Suicidal ideation and self-harm	5.6%	13.0%	10.9%	82.01 <sub>p&lt;0.001</sub>
Suicide attempts	3.5%	10.2%	8.3%	81.04 <sub>p&lt;0.001</sub>
Suicide ideation (with and without self-harm)	16.1%	28.4%	25%	71.87 <sub>p&lt;0.001</sub>

Note: statistical analyses: Chi-square ( $\chi^2$ )

TABLE 3. Self-harm and suicidal behaviour (ASSB) reported by adolescents with and without pain-related functional impairment (%)

	No impairment	Impairment	Total	X <sub>2</sub>
No ASSB	57.7	42.4	51.6	
Self-harm only	9.0	10.3	9.5	1.77 p=0.184
Suicidal ideation without self-harm	13.7	15.0	14.2	1.105 p=0.29
Suicidal ideation and self-harm	10.8	15.9	12.9	20.03 p<0.001
Suicide attempts	7.2	14.3	10.1	47.67 p<0.001

Note: statistical analyses: Chi-square ( $\chi^2$ )

TABLE 4. Number of musculoskeletal pain sites by associated factors; gender, self-harm and suicidal behaviour (ASSB) and anxiety/depression (%).

Variables	Number N	Number of pain sites, n					Total N=4551	X <sub>2</sub>
		n=0 N=1273	n=1 N=1312	n=2 N=944	n=3 N=612	n=4 N=410		
<b>Gender</b> (% within gender)								
Male	2284	34.3	30.8	19.1	9.5	6.3	100	163.39 <sub>p&lt;0.001</sub>
Female	2267	21.6	26.9	22.4	17.4	11.7	100	163.39 <sub>p&lt;0.001</sub>
<b>Suicidal behaviour</b> (% within n number of pain sites)								
No suicidal behaviour	2493	71.6	62.7	52.6	39.9	28.9	57.0	
Self-harm only	409	8.7	8.4	10.4	10.1	11.1	9.4	3.57 <sub>p=0.059</sub>
<i>Male</i>	247	10.1	10.2	13.1	12.6	18.3	11.5	7.55 <sub>p=0.006</sub>
<i>Female</i>	162	6.5	6.3	8.1	8.8	7.4	7.3	1.57 <sub>p=0.21</sub>
Suicidal ideation without self-harm	597	10.2	14.2	15.3	15.3	16.2	13.6	13.51 <sub>p&lt;0.001</sub>
<i>Male</i>	247	8.1	11.4	12.6	12.6	13.0	10.7	6.57 <sub>p=0.01</sub>
<i>Female</i>	366	13.6	17.3	17.4	16.8	17.9	16.5	1.90 <sub>p=0.17</sub>
Suicidal ideation and self-harm	496	5.8	9.3	13.0	17.7	21.9	11.3	111.32 <sub>p&lt;0.001</sub>
<i>Male</i>	142	4.0	6.4	8.1	10.7	10.7	6.6	18.02, <sub>p=0.001</sub>
<i>Female</i>	354	8.6	12.5	17.0	21.4	27.6	16.0	59.47, <sub>p&lt;0.001</sub>
Suicide attempts	379	3.7	5.4	8.8	17.0	21.9	8.7	178.07 <sub>p&lt;0.001</sub>
<i>Male</i>	70	2.0	1.9	3.7	5.8	11.5	3.2	30.21, <sub>p&lt;0.001</sub>
<i>Female</i>	309	6.3	9.3	13.0	22.9	27.2	13.9	93.17, <sub>p&lt;0.001</sub>
<b>Anxiety/depression</b> <sup>a</sup> (% within n number of pain sites)	1266	7.9	10.4	21.5	35.1	48.9	18.8	477.46 <sub>p&lt;0.001</sub>

Note: statistical analyses: Chi-square ( $\chi^2$ ). Stratified analyses by gender, ASSB and adolescent anxiety/depression symptoms. <sup>a</sup> Hopkins Symptom Checklist-10, cut-off 1.85.

TABLE 5. Association between self-harm and suicidal behaviour (ASSB) and multisite musculoskeletal pain. Multivariable analysis adjusted for sociodemographic, physical factors, social network and stressors/emotional distress.

ASSB	N	Adolescent multisite musculoskeletal pain				
		Unadjusted OR (95% CI)	Adj. Sociodemographic <sup>a</sup> OR (95% CI)	Adj. Physical factors <sup>b</sup> OR (95% CI)	Adj. Social network <sup>c</sup> OR (95% CI)	Adj. Stressors/emotional distress <sup>d</sup> OR (95% CI)
No suicidal behaviour	2493	1.0	1.0	1.0	1.0	1.0
Self-harm only	409	1.33 (1.22-1.44) <sub>p&lt;0.001</sub>	1.34(1.22-1.47) <sub>p&lt;0.001</sub>	1.34(1.22-1.47) <sub>p&lt;0.001</sub>	1.30(1.17-1.44) <sub>p&lt;0.001</sub>	1.11 (0.99-1.25) <sub>p=0.057</sub>
Suicidal ideation without self-harm	597	1.39 (1.29-1.49) <sub>p&lt;0.001</sub>	1.37(1.27-1.49) <sub>p&lt;0.001</sub>	1.39(1.28-1.51) <sub>p&lt;0.001</sub>	1.35(1.24-1.47) <sub>p&lt;0.001</sub>	1.07(0.98-1.18) <sub>p=0.172</sub>
Suicidal ideation and self-harm	496	1.74(1.61-1.89) <sub>p&lt;0.001</sub>	1.74(1.59-1.91) <sub>p&lt;0.001</sub>	1.75(1.60-1.92) <sub>p&lt;0.001</sub>	1.65(1.50-1.83) <sub>p&lt;0.001</sub>	1.29 (1.14-1.45) <sub>p&lt;0.001</sub>
Suicide attempts	379	2.03 (1.86-2.22) <sub>p&lt;0.001</sub>	1.94 (1.75-2.16) <sub>p&lt;0.001</sub>	1.92 (1.73-2.14) <sub>p&lt;0.001</sub>	1.67 (1.48-1.88) <sub>p&lt;0.001</sub>	1.14(0.99-1.32) <sub>p=0.075</sub>

Note: statistical analysis: logistic regression (OR). Reference group = no adolescent self-harm and suicidal behaviour. <sup>a</sup> Adjusted for sociodemographic factors: gender (male as reference group), parental education, Sami ethnicity. <sup>b</sup> Adjusted for physical factors: physical injury, physical activity. <sup>c</sup> Adjusted for social network: self-efficacy, parental support, parental involvement, peer support.

<sup>d</sup> Stressors/emotional distress: adverse life events, anxiety/depression (Hopkins Symptom Checklist-10), school stress.

**Other significant variables of the fully adjusted model:**

*Self-harm only:* gender (OR:0.72, p=0.03), parental support (OR:1.08, p=0.006), parental involvement (OR=1.19, p<0.001), negative life-events (OR=1.15, p=0.002), school-related stress (OR=1.1, p=0.02), HSCL-10 (OR=3.5, p<0.001)

*Suicidal ideation only:* gender (OR=1.6, p=0.001), peer-support (OR=1.1, p=0.027), life-events (OR=1.2, p<0.001), school-related stress (OR=1.1, p=0.01), HSCL-10 (OR=5.22, p<0.001).

*Suicidal ideation and self-harm:* gender (OR=1.2, p<0.001), parental support (OR=1.2, p<0.001), parental involvement (OR=1.2, p<0.001), hours of workout (OR=0.84, p= 0.05), negative life-events (OR=1.16, p=0.002), school-related stress(OR=1.11, p=0.01, HSCL-10 (OR=8.20, p<0.001).

*Suicide attempts:* gender (OR=4.03, p<0.001), parental support (OR=1.17, p<0.001), parental involvement (OR=1.16, P=0.001), negative life-events (OR=1.34, p<0.001), school-related stress (OR=1.18, p=0.001), HSCL-10 (OR=7.70, p<0.001).

## 7 GRADE

<b>Referanse:</b> Eckhoff C, Sørvold MT, Kvernmo S. Adolescent self-harm and suicidal behavior and young adult outcomes in indigenous and non-indigenous people. Eur Child Adolesc Psychiatry. 2020;29(7):917–27			<b>Studiedesign:</b> Kohortestudie
			Grade - kvalitet II
<b>Formål</b>	<b>Materiale og metode</b>	<b>Resultater</b>	<b>Diskusjon/kommentarer/sjekkliste</b>
Examine the associations between self-harm and suicidal behavior (ASSB) in indigenous Sami and non-Sami adolescents and mental health and social outcomes in young adulthood.	<b>Populasjon:</b> NAAHS: 10th graders in the three northernmost counties in Norway. 3987 (68%) of all 5877 invited participants consented to the registry linkage.  <b>Hovedutfall:</b> Long-term medical benefits, long-term social welfare benefits, long-term unemployment, mental health disorders.  <b>Statistiske metoder</b> - Chi-square tests were used for the bivariate analyses. - The Mantel–Haenszel test of linear trend was used for the associations of the extent of suicidal behaviour, and Yates’s Chi-squared tests for 2 × 2 tables were employed as well. - Logistic regression was used for the multivariable analyses for the dichotomized adult outcomes.	<b>Main findings</b> <b>Between exposes/unexposed:</b> • Self-harm and suicidal behavior in Sami and non-Sami adolescents were associated with increased risk of later mental health disorders, long-term welfare benefit receipt, and long-term unemployment. • These associations were attenuated by adolescent psychosocial problems. • No major differences between the indigenous Sami participants and their non-Sami peers were found. • Young suicide attempters experienced the highest risk, with adolescent suicide attempts being significantly associated with all four adult outcomes after adjustment.  <b>How strong is the OR?</b> <b>Youth suicide attempters, adjusted model, adult mental health disorders, OR (95% CI)</b> 2.64 (1.79–3.91)p < 0.001 <b>long-term medical welfare benefits, OR (95% CI)</b> 2.60 (1.70–3.97)p < 0.001 <b>long-term social welfare benefits, OR (95% CI)</b> 3.74 (2.38–5.87)p < 0.001 <b>Adult long-term unemployment, OR (95% CI)</b> 2.06 (1.42–2.99)p < 0.001	<b>Sjekkliste:</b> • Formålet klart formulert? <b>Yes</b> • Er gruppene rekruttert fra samme populasjon/befolkningsgruppe? <b>Yes</b> • Var gruppene sammenliknbare i forhold til viktige bakgrunnsfaktorer? <b>Yes</b> • Var de eksponerte individene representative for en definert befolkningsgruppe/populasjon? <b>Yes</b> • Ble eksposisjon og utfall målt likt og pålitelig (validert) i de to gruppene? <b>Yes</b> • Er den som vurderte resultatene (endepunkt- ene) blindet for gruppetilhørighet? <b>No</b> • Var studien prospektiv? <b>YES</b> • Ble mange nok personer i kohorten fulgt opp? <b>YES</b> • Er det utført frafallsanalyser? <b>NO</b> • Var oppfølgingstiden lang nok til å påvise positive og/eller negative utfall? <b>YES</b> • Er det tatt hensyn til viktige konfunderende faktorer i design/gjennomføring/analyser? <b>YES</b> • Bradford Hills criteria : Streights, consistency, plausibility <b>YES</b> . Temporality og specificity, biological gradient <b>NO</b> . Kan resultatene overføres til den generelle befolkningen? <b>YES</b> • Annen litteratur som styrker/svekker resultatene? <b>YES</b> • Hva betyr resultatene for endring av praksis? The results gives clinicians useful insight into the subsequent risk associated with the different behaviours in adolescence, from non-suicidal self-harm to suicidal attempts  <b>Strengths:</b> • Large and representative sample. • High quality in healthcare and welfare registries • Multiethnicity  <b>Limitations:</b> • Missing sickness benefit end dates • The population study relied on self-reports with the risk of information bias • Measures of anxiety/depression is well validated, but only measures symptoms in the previous week. • Inclusion of several factors that potentially mediate or confound each other
<b>Konklusjon</b>			
• ASSB in adolescence are markers of mental health disorders and unfavorable social outcomes in young adulthood, mostly accounted for by adolescent psychosocial problems. • In contrast to other indigenous peoples, no indigenous health disparities were found, indicating that the indigenous Sami adolescents were not worse off.			
<b>Land</b>			
Norway			
<b>År data innsamling</b>			
2003-2005: Norwegian Arctic Adolescent Health Study(NAAHS), a school-based survey inviting all 10th grade students in North Norway. 2003-2013: National Insurance Registry 2008-2012: Norwegian Patient Registry .			

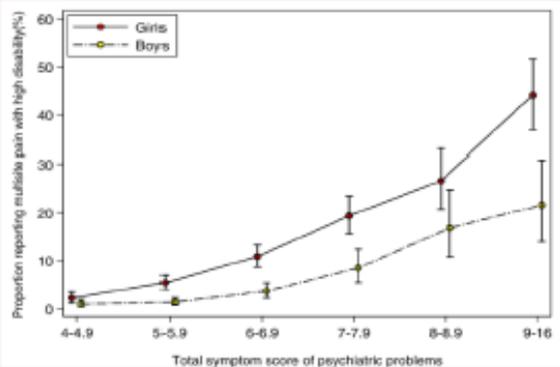
Referanse: Strandheim A, Bjerkeset O, Gunnell D, Bjørnelv S, Holmen TL, Bentzen N. Risk factors for suicidal thoughts in adolescence-a prospective cohort study: The Young-HUNT study. BMJ Open. 2014;4(8)			Studiedesign: Kohortestudie
			Grade – kvalitet II
Formål	Materiale og metode	Resultater	Diskusjon/kommentarer/sjekkliste
Examin the associations between health and lifestyle factors recorded in the participants' early teens and development of suicidal thoughts recorded 4 years later.	<b>Populasjon:</b> 2399 secondary school students in a follow-up study 4 years later (17–19 years old). Kohorter: 3.9 years follow-up	<b>Main findings</b> <b>Between exposes/unexposed:</b> - Anxiety and depressive symptoms, attention and conduct problems, insomnia, pain/tension problems and smoking at baseline more than doubled the odds for suicidal thoughts at follow-up in both genders. - anxiety and depression and pain and tension problems was associated with later suicidal ideation, especially among boys.	<ul style="list-style-type: none"> <li>• <b>Sjekkliste:</b></li> <li>• Formålet klart formulert? <b>yes</b></li> <li>• Er gruppene rekruttert fra samme populasjon/befolkningsgruppe? <b>Yes</b></li> <li>• Var gruppene sammenliknbare i forhold til viktige bakgrunnsfaktorer? <b>Yes</b></li> <li>• Var de eksponerte individene representative for en definert befolkningsgruppe/populasjon? <b>Yes</b></li> <li>• Ble eksposisjon og utfall målt likt og pålitelig (validert) i de to gruppene? <b>Not all questions were validated</b></li> <li>• Er den som vurderte resultatene (endepunkt- ene) blindet for gruppetilhørighet? <b>It does not say.</b></li> <li>• Var studien prospektiv? <b>yes.</b></li> <li>• Ble mange nok personer i kohorten fulgt opp? <b>Yes.</b></li> <li>• Er det utført frafallsanalyser? <b>No</b></li> <li>• Var oppfølgingstiden lang nok til å påvise positive og/eller negative utfall? <b>YES</b></li> <li>• Er det tatt hensyn til viktige konfunderende faktorer i design/gjennomføring/analyser? <b>Yes</b></li> <li>• Tror du på resultatene? <b>Yes.</b></li> <li>• Bradford Hills criteria: Streights, consistency, plausibility <b>YES.</b> Temporality og specifisity, biological gradient <b>NO.</b> Coherence, experiment, analogy: –</li> <li>• Kan resultatene overføres til den generelle befolkningen? <b>YES</b></li> <li>• Annen litteratur som styrker resultatene? <b>Yes</b></li> <li>• Hva betyr resultatene for endring av praksis? <b>Awareness regarding prevention and knowledge about at risk adolescents.</b></li> </ul> <p><b>Strengths:</b></p> <ul style="list-style-type: none"> <li>• Large study population</li> <li>• Representative population</li> <li>• few drop-outs at follow-up</li> </ul> <p><b>Limitations:</b></p> <ul style="list-style-type: none"> <li>• Nutritional status and gestational weight gain of the participants could affect outcomes.</li> <li>• self-harm and suicidal behaviour not measures at baseline</li> <li>• at follow-up some students were attending vocational training and were not at school when the study was conducted. They were invited by post, but the response rates were low (34%).</li> </ul>
<b>Konklusjon</b>	<b>Hovedutfall:</b> Suicidal thoughts reported at age 17–19 years.	Anxiety/depressive symptoms Total: OR:2.7 CI: 2.1 to 3.4 aOR: 1.9 CI: 1.4 to 2.6	
One in six young adults experienced suicidal thoughts, girls predominating. Suicidal thoughts were most strongly associated with symptoms of anxiety/depression, conduct problems, pain/tension and overweight reported when participants were 13–15 years old.	<b>Statistiske metoder</b> <b>Logistic regression:</b> 1. univariable logistic regression analyses were first used to examine the crude associations between health and behavioural exposures with suicidal ideation at follow-up	Boys: 3.5 CI: 2.3 to 5.4 aOR 2.8 CI: 1.7 to 4.8	
<b>Land</b>	2. Data stratified by gender, adjusted for age: then all variables were entered again, thus adjusting or each other.	Girls: 2.3 CI: 1.7 to 3.1 aOR: 1.5 CI: 1.0 to 2.2	
<b>Ar data innsamling</b>		Pain and tension problems Total: OR: 2.7 CI: 2.1 to 3.4 aOR: 1.8 CI:1.4 to 2.4	
Norway		Boys: OR: 3.1 CI: 2.1 to 4.8 aOR: 2.0 CI: 1.2 to 3.3	
First wave: 1995-1997 Second wave: 2000-2001		Girls: OR: 2.3 CI: 1.7 to 3.2 aOR: 1.7 CI:1.2 to 2.5	
		<b>Dose-response?</b> Not commented in article	
		<b>Bifunn</b> The protective effect of physical activity was evident among boys (aOR 0.6 CI 0.4 to 0.9) but not significantly among girls (aOR 0.7 CI 0.5 to 1.1).	

Referanse: Skrove M, Romundstad P, Indredavik MS. Chronic multisite pain in adolescent girls and boys with emotional and behavioural problems: the Young-HUNT study. Eur Child Adolesc Psychiatry. 2015;24(5):503–15.

Studiedesign: Kasus-kontroll

Grade - kvalitet

II

Formål	Materiale og metode	Resultater	Diskusjon/kommentarer/sjekkliste																					
<ul style="list-style-type: none"> <li>• assess the prevalence of chronic multisite pain (CMP) with high disability in relation to emotional or behavioral problems and resilience factors in adolescence.</li> <li>• Investigate if resilience factors could attenuate the associations between psychiatric symptoms and chronic multisite pain. The study</li> </ul>	<p><b>Populasjon:</b></p> <p><b>Kasus</b> Adolescents with CMP was defined as chronic pain with high disability, in three or more locations</p> <p><b>Kontroller</b> Adolescents without CMP with high disability</p>	<p><b>Hovedfunn:</b></p>  <table border="1"> <caption>Data from the line graph: Proportion reporting multisite pain with high disability (%)</caption> <thead> <tr> <th>Total symptom score of psychiatric problems</th> <th>Girls (%)</th> <th>Boys (%)</th> </tr> </thead> <tbody> <tr> <td>4-4.9</td> <td>~2</td> <td>~1</td> </tr> <tr> <td>5-5.9</td> <td>~5</td> <td>~2</td> </tr> <tr> <td>6-6.9</td> <td>~10</td> <td>~4</td> </tr> <tr> <td>7-7.9</td> <td>~18</td> <td>~8</td> </tr> <tr> <td>8-8.9</td> <td>~25</td> <td>~15</td> </tr> <tr> <td>9-16</td> <td>~45</td> <td>~22</td> </tr> </tbody> </table>	Total symptom score of psychiatric problems	Girls (%)	Boys (%)	4-4.9	~2	~1	5-5.9	~5	~2	6-6.9	~10	~4	7-7.9	~18	~8	8-8.9	~25	~15	9-16	~45	~22	<p><b>Sjekkliste:</b></p> <ul style="list-style-type: none"> <li>• Er formålet klart formulert? Yes.</li> <li>• Er kasus-kontroll design egnet for formålet? Yes</li> <li>• Er kasus rekruttert på en «god» måte? Yes</li> <li>• Diangosen validert? Yes</li> <li>• Er kontrollene rekrutterte på en «god» måte? Yes</li> <li>• Kan det utelukkes at kontrollgr. fri for aktuelle sykdom? Yes</li> <li>• Var kasus-kontrollgruppene hentet fra sammenlignbare befolkningsgrupper? YES</li> <li>• Non-responders/nekter å delta – frafalls analyser? Not executed</li> <li>• Er gruppene sammenlignbare i forhold til viktige bakgrunnsfaktorer?* YES</li> <li>• Er main exposure validert? YES</li> <li>• Er gruppene «behandlet» likt – kan påvirke «exposure»? Equally treated.</li> <li>• Har forfatterne tatt hensyn til viktige konfunderende faktorer i design/analyse? Yes</li> <li>• Er eksponering for fare, skade, tiltak målt og gradert likt i begge gruppene? Not relevant</li> <li>• Var den som målte eksponering/samlet inn data blinda mht hvem som var kasus/kontroll? Not relevant</li> <li>• Tror du på resultatene? Yes</li> <li>• Kan resultatene overføres til praksis? Yes</li> <li>• Støtter litteraturen resultatene? Yes</li> </ul>
Total symptom score of psychiatric problems	Girls (%)	Boys (%)																						
4-4.9	~2	~1																						
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8-8.9	~25	~15																						
9-16	~45	~22																						
<p><b>Konklusjon</b></p>	<p><b>Inklusjons-/eksklusjonskriter.</b></p>	<p><b>Hvor stor er effekten? (adjusted odds ratio)</b></p>	<p><b>Strengths:</b></p>																					
<ul style="list-style-type: none"> <li>• CMP among adolescents with behavioral symptoms</li> <li>• the prevalence was higher among girls and among adolescents with several coexisting psychiatric symptoms</li> <li>• resilience factors such as family cohesion, self-esteem and seldom/never feeling lonely markedly attenuated the association between psychiatric symptoms and CMP</li> </ul>	<p>Adolescents with missing responses to pain or psychiatric symptoms scales. Adolescents younger than 13 years.</p> <p><b>Hovedeksponering:</b></p> <ul style="list-style-type: none"> <li>- Symptoms of anxiety/ depression, social anxiety, conduct or attention problems.</li> <li>- Resilience factors</li> </ul> <p><b>Viktige konfunderende faktorer</b></p>	<p><b>Statistiske metoder</b></p> <ul style="list-style-type: none"> <li>- Descriptive analysis: prevalence of pain in relation to psychiatric symptoms and resilience factors.</li> <li>- Multiple logistic regression : odds ratios (ORs) for the associations between psychiatric symptoms and CMP</li> </ul> <p>Attention problems: Girls: 3.1 (CI: 2.1-4.8) Boys: 2.9 (CI: 1.5-5.9)</p>	<p>Not relevant</p> <p>Tror du på resultatene? Yes</p> <p>Kan resultatene overføres til praksis? Yes</p> <p>Støtter litteraturen resultatene? Yes</p>																					
<p><b>Land</b></p>		<p><b>Bifunn</b></p>	<p>Large unselected population of adolescents</p>																					
<p>Norway</p>		<p>Resilience factors were associated with a lower prevalence of pain and markedly attenuated the association between psychiatric symptoms and chronic multisite pain.</p>	<p>strict definition of chronic pain that included only chronic pain in multiple locations and with a high level of disability</p>																					
<p><b>År data innsamling</b></p>			<p><b>Limitations:</b></p>																					
<p>2006-2008</p>			<ul style="list-style-type: none"> <li>• risk of recall-bias in the adolescents' completion of the questionnaires</li> <li>• Causality cannot be concluded due to study design</li> <li>• Results might not without reservations be generalized to adolescents living in more urban areas.</li> </ul> <p><b>Har resultatene plausible biologiske forklaringer?</b> Yes</p>																					

Referanse:			Studiedesign: Kasus-kontroll
Junker A, Bjørngaard JH, Bjerkeset O. Adolescent health and subsequent risk of self-harm hospitalisation: a 15-year follow-up of the Young-HUNT cohort. Child Adolesc Psychiatry Ment Health. 2017;1-14.			Grade – kvalitet <b>II</b>
Formål	Materiale og metode	Resultater	Diskusjon/kommentarer/sjekkliste
- examine the association between different aspects of adolescent health and risk of later self-harm requiring hospital admission	<b>Populasjon</b> Participants of 13 to 19 year old (n = 8965) in the Norwegian Young-HUNT 1, in Nord-Trøndelag County, Norway	<b>Hovedfunn</b> Significant crude probability estimates [95%CI] HR(migraine)=2.7, [1.3-5.9]; HR(headache)=2.7, [1.7-4.2]; HR(stomach pain)=2.7, [1.8-4.3] HR (symptoms anxiety/depression)=4.46 (2.80-7.10) 1.00	<b>Sjekkliste:</b> <ul style="list-style-type: none"> <li>Er formålet klart formulert? YES</li> <li>Er kasus-kontroll design egnet for formålet? YES</li> <li>Er kasus rekruttert på en «god» måte? YES</li> <li>Diangosen validert? No</li> <li>Er kontrollene rekrutterte på en «god» måte? YES</li> <li>Kan det utelukkes at kontrollgr. fri for aktuelle sykdom? No. self-harm is in general underreported</li> <li>Var kasus-kontrollgruppene hentet fra sammenlignbare befolkningsgrupper? YES</li> <li>Non-responders/nekter å delta – frafalls analyser? Not executed</li> <li>Er gruppene sammenlignbare i forhold til viktige bakgrunnsfaktorer?* YES</li> <li>Er main exposure validert? No</li> <li>Er gruppene «behandlet» likt – kan påvirke «exposure»? YES</li> <li>Har forfatterne tatt hensyn til viktige konfunderende faktorer i design/analyse? YES</li> <li>Er eksponering for fare, skade, tiltak målt og gradert likt i begge gruppene? Not relevant</li> <li>Var den som målte eksponering/samlet inn data blinda mht hvem som var kasus/kontroll? NO</li> <li>Tror du på resultatene? YES</li> <li>Kan resultatene overføres til praksis? Partly. Read “Limitations”.</li> <li>Støtter litteraturen resultatene? YES</li> </ul>
<b>Konklusjon</b> - Several health issues during adolescence markedly increased the risk of later self-harm hospitalisation.	-kasus (definisjon/validert?) All self-harm episodes that required hospitalisation	Significant adjusted probability estimates [95%CI] aHR(migraine)=2.3, [1.1-5.1]; aHR(headache)=2.2, [1.4-3.5]; aHR(stomach pain)=2.2, [1.4-3.5] aHR (symptoms anxiety/depression)=3.52 (2.18-5.67)	<b>Strengths:</b> <ul style="list-style-type: none"> <li>prospective design, long follow-up time, large sample size, validated clinical outcome measurements, minimal misclassification</li> </ul>
<b>Land</b> Norway	<b>Inclusion:</b> Self-harm episodes leading to hospitalisation	Symptoms of anxiety and depression, loneliness and being subject to bullying were all strongly associated with the risk of self-harm hospitalisation. Self-reported stomach pains and headaches were associated with self-harm hospitalisation, as were epilepsy and migraine.	<b>Limitations:</b> <ul style="list-style-type: none"> <li>end-point data registered by four different persons. Analysis cannot be generalized to other and milder forms of self-harm, not leading to hospitalisation. Study does not differentiate non-suicidal self-injury (NSSI) from suicidal self-harm (suicide attempts).</li> </ul>
<b>År data innsamling</b> - 1995-1997: The Young-HUNT 1 Study - 1995-2010.	<b>Exclusion:</b> Accidental self-harm and events resulting in bodily damage, but without evidence of suicidal intention		Har resultatene plausible biologiske forklaringer? YES
	<b>Hovedeksponering:</b> Loneliness, being bullied, depression and anxiety, somatic illness, BMI, smoking status and alcohol use. <b>Viktige konfunderende faktorer</b> age, gender, parental cohabitation situation, socioeconomic status (highest educational level for mother or father) <b>Statistiske metoder</b> - Cox regression to estimate risk factor hazard ratios (HR). - Schoenfeld residuals test to test the proportional hazard assumption in the Cox analysis - xpopulation attributable fractions (PAF) for the anxiety and depression variable		

<b>Referanse:</b> Halvorsen JA, Dalgard F, Thoresen M, Bjertness E, Lien L. Itch and pain in adolescents are associated with suicidal ideation: A population-based cross-sectional study. Acta Derm Venereol. 2012;92(5):543–6.			<b>Studiedesign:</b> Kasus-kontroll
			<b>Grade - kvalitet</b> II
			<b>Diskusjon/kommentarer/sjekkliste</b>
<b>Formål</b> - Analyse the association between itch and suicidal ideation in adolescents - Compare the findings with an expected association between pain and suicidal ideation	<b>Materiale og metode</b> <b>Populasjon</b> Adolescents in Oslo aged 18 or 19 years. 4,744 adolescents were invited and 3,775 (80%) completed the questionnaire.  <b>Kasus</b> Adolescents with suicidal ideation and itch  <b>Kontroll</b> Adolescents with suicidal ideation and pain	<b>Resultater</b> <b>Hovedfunn</b> <b>Hvor stor er effekten?</b>  Significant adjusted associations between suicidal ideation and severe itch were found in the whole sample (OR 3.0, 95% CI 2.1–4.2)  Significant adjusted associations between suicidal ideation and three to five pain sites were found in the whole sample (or 3.8, 95% CI 2.6–5.7)  Bifunn: findings were similar and statistically significant in girls and boys separately.	<b>Sjekkliste:</b> <ul style="list-style-type: none"> <li>• Er formålet klart formulert? YES</li> <li>• Er kasus-kontroll design egnet for formålet? YES</li> <li>• Er kasus rekruttert på en «god» måte? YES</li> <li>• Diangosen validert? YES, Hopkins symptom Checklist</li> <li>• Er kontrollene rekrutterte på en «god» måte? YES</li> <li>• Kan det utelukkes at kontrollgr. fri for aktuelle sykdom? NO.</li> <li>• Var kasus-kontrollgruppene hentet fra sammenlignbare befolkningsgrupper? YES</li> <li>• Non-responders/nekter å delta – frafalls analyser? NO</li> <li>• Er gruppene sammenlignbare i forhold til viktige bakgrunnsfaktorer? YES</li> <li>• Er main exposure validert? NO</li> <li>• Er gruppene «behandlet» likt – kan påvirke «exposure»? YES</li> <li>• Har forfatterne tatt hensyn til viktige konfunderende faktorer i design/analyse? YES</li> <li>• Er eksponering for fare, skade, tiltak målt og gradert likt i begge gruppene? Unknown</li> <li>• Var den som målte eksponering/samlet inn data blinda mht hvem som var kasus/kontroll? NO</li> <li>• Tror du på resultatene? YES</li> <li>• Kan resultatene overføres til praksis? YES</li> <li>• The results should encourage health workers to increase the health services to young patients presenting with somatic symptoms, including itch</li> <li>• Støtter litteraturen resultatene? YES</li> </ul> <b>Strengths:</b> <ul style="list-style-type: none"> <li>• A non-treatment- seeking sample and the relatively high participation rate (80%).</li> <li>• Use of validated questions</li> <li>• Inclusion of register data about income and ethnicity</li> </ul> <b>Limitations:</b> <ul style="list-style-type: none"> <li>• Causality cannot be concluded due to study design .</li> <li>• Unmeasured confounders like personalitytraits and improper categorizing of ethnicity</li> <li>• number of missing in the regression analyses</li> </ul> Har resultatene plausible biologiske forklaringer? YES
<b>Konklusjon</b> - Itch and pain are approximately equally strongly associated with suicidal ideation in a large general population of adolescents.			
<b>Land</b> Norway			
<b>År data innsamling</b> 2004	<b>Hovedeksponering:</b> <ul style="list-style-type: none"> <li>- Itch (no itch, a little itch, severe itch)</li> <li>- Pain (no pain site, one or two pain sites, and three to five pain sites)</li> </ul> <b>Viktige konfunderende faktorer</b> Family income and ethnicity <b>Statistiske metoder</b> Chi square test for trend was used to test for trend over increasing levels of itch and pain. odds ratios were calculated in both crude and adjusted logistic regression mode		